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Method of Operating Flooded Gravel Pits

Difficulties encountered by the Clem Gravel Co. of Dallas, Tex. in operating a wet gravel pit by steam shovel, with a description of how they overcame difficulties by the use of dragline excavators.

A. W. CLEM of Dallas has gained for himself the best financier in Texas, as it is said among his friends, a reputation of being that he did $100,000 business in a year on a capital of $2.00. This may sound like a fairy tale. However, be it as it may, here is the story.

The Clem Gravel Co. of Dallas was organized in 1910 to operate a number of sand and gravel pits in the vicinity of Dallas Tex.

At the present time they have three pits in operation. One at Trinity Mills, Tex., on the Missouri, Kansas & Texas Railway, operated with a Bucyrus Class-9½ steam dragline excavator. One at Clem Spur on the Frisco, near Carrollton, Tex., about 15 miles north of Dallas and within 5 miles of the Trinity Mills pit, where a Class 14 Bucyrus dragline excavator is in operation, and a sand and gravel pit on the M. K. & T. at Ambrose, Tex., near Denison, from which a very fine quality of sand is obtained.

In this pit Mr. Clem first used what is known as a slack line excavator. This proving unsatisfactory, he discontinued this method of operation and until recently has been loading with teams. A 1-yard dragline excavator purchased second-hand, however, has recently been installed.

Trinity Mills Pit

The Trinity Mills pit contains the best grade of concrete gravel in that section of the country. The output is absorbed principally for use in connection with building work and road construction. No screening plant is used, the gravel running so clean that it is shipped as bank run and delivered into cars. The gravel runs about two parts gravel to one part sand.

Difficulties of Steam Shovel Operation

This pit was formerly worked with a small Thew steam shovel. The difficulties encountered with this installation were due, not to any mechanical fault of the shovel itself, as to the impossibility of successful operation of any steam shovel under the ground conditions existing. To quote Mr. Clem—"I am sorry for the man who operates a wet pit with anything but a dragline."

The difficulties can best be described by again quoting from Mr. Clem: "I had been operating with the old shovel in the bottom of the pit and pumping water day and night to keep it from floating away. It took all my profits to do the pumping. My track also came down into the pit. It was water-soaked and buried in mud. Engines coming down into the pit to take out loads, would have to make a run to climb the incline, break a rail, tear up the track and play the devil in general."

When the water had been pumped out, ("about 1,000,000 gallons of it," according to Mr. Clem,) the shovel averaged about 10 cars daily.

Stripping was at first done by teams. However, with the last three cuts, this was done by the shovel. In order to do this, it was necessary to cut out of the pit in order to get the shovel on to the surface. About 50 cars of gravel were generally lost in such an operation. Once up on the surface, the shovel would strip and roll the overburden as far as possible and then move back into the hole and continue loading gravel. This operation was repeated for each of the 3 cuts. By the time the 3rd cut was made and the 3rd rolling was completed, the overburden had assumed the proportions of a vast mountain.

This method was pursued for about 4 years. Constant pumping was necessary in order to keep the shovel working. Towards the end of 1914, things got worse. A number of over-flows came 30 to 60 days apart, filling the pit to the top. In addition to the expense incurred by the delay in operation, the cost of pumping in order to recover the track and the machine amounted to upwards of $6,000. Naturally Mr. Clem was discouraged and to quote him again, he found himself "busted, $10,000 in debt and with 38c in the bank."

Solving the Difficulties with a Dragline Excavator

In January 1915, a Bucyrus Class-9½ dragline excavator was installed. The machine was equipped with a 45-foot boom and a 1½ cu. yard bucket and was mounted on skids and rollers.

Its first job was to back in behind the vast mountain of dirt above mentioned which had been piled up by the steam shovel and to cast it down into the pit from which the gravel had already been mined. When this was accomplished, operations commenced. The machine operated from the surface. The track was taken from the hole and placed on the dry ground. The pumping machinery was taken out and the water allowed to rise until it struck a level at 12 to 15 feet. Loading was not hampered. The overburden, as stated above, was cast into the open pit, the dragline taking a swath of about 60 ft. Then without moving, 30 to 40 cars of concrete washed gravel was dug from beneath this overburden and loaded in a one-day working period. The machine has been loading gravel out of from 8 to 15 ft. of water ever since. According to the operator he has dug successfully at a depth of 16 ft. with water all the way from 8 to 15 ft. deep. The stripping however, was usually above the water line, as the water as a rule stops at the dirt line.

The output of the dragline excavator is governed entirely by the number of cars available. In regard to this point, Mr. Clem writes as follows:

"We have loaded into cars as high as 1,500 cu. yds. in 10 hours and when stripping, 200 yards per hour. This machine has been in constant use for over 5 years. We have been to practically no expense, other than the purchase of a new bucket, hoisting line, sheaves, etc. Only last summer, we were offered twice the amount of the original cost on this machine after 5 years of service.

Only two months ago a boiler inspector showed up to inspect the boiler. After giving it a thorough test, he asked our operator how much steam he carried and was told from 100 to 110 lbs., although it was supposed to carry 125. "Young man," he said, "it is good for 150 if you want to carry it." This inspection was five years from the date the machine was put into service and the boiler in almost continuous operation and not one flue had been replaced. The expense of operation had not been equal to the expense of continuous pumping of water under the old method.

Operation of Pit No. 2 near Carrollton

In November 1919, a Class-14 Bucyrus dragline excavator with a 60-ft. boom and a 2-yard bucket was installed in Pit No. 2 on the Frisco near Carrollton. This machine was purchased to overcome the same conditions as existed in the Trinity Mills Pit. The dragline was ready for operation on November 1st, but the car situation was such that dirt was not moved until Jan. 1st of this year. The car situation has made it impossible for the machine to work anywhere near its capacity, which is 50 to 75 cars daily.

The Product of the Clem Gravel Co.

Mr. Clem is now one of the largest operators in the state of Texas. His pits have a loading capacity of from 100 to 150 cars of gravel daily. The concrete gravel produced is recognized by the leading architects and civil engineers as the best in that section of the country. It is of the proper specification for concrete, free from clay, oil, lime or vegetable matter. No screening plants have been put in as yet in any of the pits, as the demand for unscreened gravel is greater than the output. Some of the largest re-inforced concrete buildings in the city of Dallas and throughout Texas have been constructed from the foundation up with gravel from these pits. Among these may be mentioned the Union Station and the Interurban Station at Dallas, the White Rock Reservoir and the Dallas Filter Plant.

Dan M'Gann

Dan M'Gann Declares Himself

Said Dan M'Gann to a foreign man who worked at the self-same bench:
"Let me tell you this," and for emphasis he flourished a Stillson wrench.
"Don't talk to me of the bourjoissee, don't open your mouth to speak
Of your socialists or your anarchists, don't mention the bolsheveek,
For I've had enough of this foreign stuff, I'm sick as a man can be
Of the speech of hate, and I'm tellin' you straight that this is the land for me."
"If you want to brag, just take that flag, and boast of its field o' blue.
An' praise the dead an' the blood they shed for the peace o' the likes o' you.
I'll hear no more," and he waved once more, his wrench in a forceful way,
"O' the cunning creed o' some Russian breed, I stand for the U. S. A.
I'm done with your fads, and your wild-eyed lads, don't flourish your rag o' red
Where I can see or at night there'll be tall candles around your bed."
"So tip your hat to a flag like that. Thank God for its stripes an' stars,
Thank God you're here where the roads are clear, away from your kings and czars.
I can't just say what I feel today, for I'm not a talkin' man,
But first an' last, I'm standin' fast for all that's American.
So don't you speak of the bolsheveek, it's sick of that stuff I am.
One God, one flag is the creed I brag. I'm boostin' for Uncle Sam."

Edgar A. Guest.

From Byers Piper

Digging the Daniel Mizer Drain

A remarkable illustration of the versatility of the dragline excavator. How East & De Frees, of Worthington, Ind., made a crossing of the West Fork of the White River with their dragline, crossed a 12-foot railroad embankment, dug through the frozen right-of-way of the Vandalia Railroad, overcame quicksand, and averaged 83,000 cu. yards of material per month for the job. A description of gravel plant operated by this Company before the ditch was started.

ALTHOUGH this work was completed sometime ago, it is of unusual interest as an illustration of the variety of work which a dragline excavator can do successfully in the hands of an experienced and resourceful contractor.

The Daniel Mizer ditch is part of a drainage system being constructed by Green, Owen and Clay Counties near Worthington, Ind., for the purpose of draining low land adjacent to the Ell River and West Fork of the White River.

The work was done by East & De Frees of Worthington, Ind. under the personal direction of C. J. De Frees who acted as superintendent and operated the machine part of the time. His equipment consisted of a Class-24 Bucyrus dragline with a 100 ft. boom and a 3½ cu. yd. bucket. The contract called for excavation of somewhat over 500,000 cu. yds. of material, including 12,000 yards of rock and some quicksand. As shown on the accompanying sketch, the dragline had originally been operating in a gravel pit on the old channel of the West Fork of the White River. (The operation of this gravel pit will be described later on.)

In 1913 the normal flow of this channel had been diverted by the dredging of a new 300 ft. channel with a small suction dredge, which dredge is shown in one of our views illustrating the gravel plant. This channel straightened the course of this river and created a new junction of this river with the Ell River, as shown on the sketch.

At the time East & De Frees received this contract, the dragline was in the gravel pit above mentioned. It was necessary to move it to the head of the ditch on the Ell River a half mile east of Worthington at the point indicated on the sketch. In order to do this, the contractors were confronted with the problem of getting the dragline on the job in the shortest time possible. The old channel of the Ell River presented a serious barrier. It was a question of either knocking the machine down and transporting it, which opera-

Bucyrus Class-24 dragline, East & De Frees, digging the Daniel Mizer drainage ditch near Worthington, Ind. The machine is here shown in a cut 18 feet deep, 50 feet wide on the bottom and 70 feet on the top.

tion would have consumed much valuable time, or of attempting the original and somewhat radical plan of building a grade over the river and crossing thereon. Mr. De Frees, however, determined upon the latter course.

Crossing the White River Channel

This was in February 1917. The dragline was moved down to the point shown on the sketch, close to the old junction of the Ell and the White Rivers. At this point the river was about 300 ft. across. The time was selected when the water was at its lowest level, namely about 13 ft. deep. The grade was built at an angle, about 450 ft. long and 35 ft. in height above the river bottom, with a top width of about 45 ft.

The base of this grade was first pumped in with a hydraulic dredge to a width of approximately 150 ft. at the bottom. The dragline then completed the grade. The first operation was to borrow the material at the side, piling it in front of itself, so as to form the grade. In order to compact the ground sufficiently so that it would hold the weight of the dragline safely, Mr. De Frees deposited a sufficient bulk of material above the grade line to correspond in weight to the weight of the machine. When a sufficient amount was thus deposited, the dragline was moved forward a little further and another pile was placed in this manner further on. When the dragline arrived at this point, the pile was dug down to grade line and deposited again further ahead. The pile averaged 8 ft. from the grade line to the top. As stated, the river was 30 ft. deep at low water mark at this point. The crossing was successfully accomplished in about a weeks' time.

Crossing the Vandalia Right-of-Way

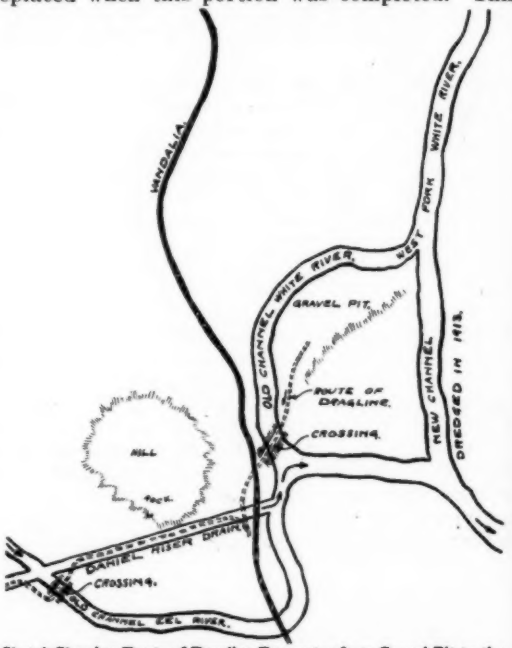
The next problem was that of crossing the fill of the Vandalia Railroad which paralleled the old channel of the White River at this point.

The right-of-way here was 50 ft. from the river bank to the center of the tracks. The railroad embankment was 12 ft. in height. It was necessary, therefore, to get the machine up and over this grade. No assistance was available except that which the dragline could give itself. It being the month of February, the railroad fill was sufficiently frozen to afford a safe anchorage for the dragline bucket. The crossing was safely accomplished, the machine pulling itself over successfully. Mr. De Frees states that a doubter would only have to examine the grade to be convinced as to the truth of this remarkable accomplishment, as the landmarks still remain.

Digging the Daniel Mizer Drain

The journey was then easily made to the point where the actual work on the Daniel Mizer Drain was to be started. (See sketch).

Here the railroad runs close to the bank of the Ell River. Mr. De Frees started his dragline just on the other side of the railroad embankment from the river. The railroad had driven four bents of 55 ft. piling across the line of the proposed ditch. As the dragline cut its way through the embankment, the bents were removed one at a time and the track was lifted off in sections and replaced when this portion was completed. This



Sketch Showing Route of Dragline Excavator from Gravel Pit to the Head of the Daniel Mizer Drain, near Worthington, Ind.

was done with but a few hours delay to the railroad. The distance between the top of the tie to grade was 28 ft. 11 in., the ditch measuring 50 ft. wide on the bottom with a ½ to 1 slope. The total distance through was about 150 ft. which was dug by swinging the bucket between the bents. 5,239 cu. yds. were taken out of the right-of-way at this point. The job was accomplished with no confusion whatsoever, and as stated above, with the least possible delay to the railroad, in spite of the fact that the unusual difficulties were aggravated by the fact that the top of the embankment exposed to the wind was solidly frozen to a thickness of 3 ft. 6 in. This material, under the most favorable conditions would have been a tough proposition to handle, as it consisted of firmly packed old road bed. The dragline never failed to pull the material out after a good hold had been obtained with the bucket.

This completed, the dragline constructed the ditch between this point and the next river crossing, a distance of about 900 ft., the ditch being 90 ft. wide at the top with a bottom width of 50 ft., the average depth being a little better than

20 ft. Through this portion the dragline encountered 19 ft. of sand stone, more than 75% of which was dug without blasting. The work was done in the winter and large chunks of frost which were too hard to dobie had to be chained, as they were so large that they had to be pulled into the bucket edgewise. Mr. De Frees states that the performance of the dragline was remarkable on this job, as it never failed to tear out any rock which it was possible to get hold of. There were 12,000 yards of rock encountered on this stretch

Work was started at Station 935+19 and ended at Station 615. However, there were four stretches, some running over a mile in length where the old channel was made use of and no work was required. The drain was dug up stream, which of course, was a point in which the farmers were vitally interested, as it did not cause any over-flow since the ditch was at all times ready to take care of the flow. This, by the way, is one of the strongest arguments for dragline work.

How Quicksand was Handled

The next problem encountered, which showed the quality of Mr. De Frees' gray matter and Yankee resourcefulness, was quicksand. Between Station 715 and 701, a slide of water-bearing sand, commonly known as quicksand, was encountered. This quicksand lay on top of a strata of slate and coal.

Mr. De Frees first attempted to obtain grade by casting the dirt far enough away from the ditch so as to obviate the danger of caving. However, conditions were so bad that the quicksand was forced up from the bottom by the pressure of the excavated material. The quicksand was so thin, that a boat could have been paddled through it. When 400 feet of ditch was completed, Mr. De Frees discovered that he was 4 ft. above grade, a rise of 1%. He quickly realized that nothing could be accomplished by further digging, as the increased accumulation of weight would only made bad matters worse. Accordingly he was satisfied to continue the procedure, digging through the sand until the river channel was reached, over which he was obliged to make a crossing. Here he dammed the river holding the flow for 36 hours, building the dam ahead of the rise in the water until a head of 20 ft. of water had been obtained. Then he cut the dam and allowed the water to go with a rush. This proved completely successful. The rush of water in 5 minutes cut the channel to 7 ft. below grade. The quicksand was scoured out from under the top soil for some distance to either side of the ditch, the top soil of the berm falling with the receding of the water, thus effectively sealing off any further flow of quicksand and effectively preventing a cave-in. The only damage done by the rush of water was the loosening of the piling of the Vandalia Railroad bridge at Station 716, about 100 feet below this point, throwing the bridge out of line 24 inches.

Output of Dragline

Work was started on the drain on Feb. 27, 1917. On March 17, work was stopped on account of flood, the dragline being partly covered with water. On June 27th, work was again started in 6 in. of water. In August lack of labor, sufficient to clear the right-of-way of timber held up operations for 14 days. The job was finished the day before Thanksgiving, 1917.

When the dragline was operating between Stations 800 and 900, an average output of 5,000 cu. yards per day was obtained. The average output for the job was 83,000 cu. yds. per month, working single shifts.

Class-24 Bucyrus Dragline Excavator, East & De Frees, Digging Gravel from River and Loading It in a Hopper 70 feet Above Bottom of Pit.

Description of Gravel Plant

Before the Class-24 dragline was put on this job, it had been used by East & De Frees in a gravel plant on the West Fork of the White River in Green County, not far from this point. This plant is illustrated in the accompanying views.

The dragline was equipped as stated with a 3½-yard bucket and a 100-ft. boom. The gravel was taken out of the river from a depth of from 25 to 30 ft. and dumped into a hopper about 70 ft. above the bottom of the pit, from which it was screened and fed directly in hopper railroad cars. The dragline averaged a cycle per minute and three trips in 120 seconds, and has loaded a 40 cu. yd. car after the gravel had been screened, in 17 minutes. Mr. De Frees states that without screening this has frequently been done in 7 minutes.

There was some delay in the operation of the dragline, due to the fact that the gravel must run out of the hopper before another load can be deposited. Every bucketful contained about 50% waste material, which was pumped through a 14 in. pipe line into the river. The plant had a capacity of about 45 cars per day, comprising 20 cars of washed gravel, 15 cars of washed concrete gravel and 10 cars of sand. The 10-ft. hydraulic dredge shown in the photograph is being used to pump water in order to wash the sand.

Gravel Pit Operation, Alaskan Engineering Commission

A Statement of the Operation of a Small Revolving Shovel in Gravel Pits, near Nenana, Alaska.

THE Alaskan Railroad, which is being built by the Alaskan Engineering Commission runs in general from Seaward Alaska by way of Anchorage up Broad Bass through the Alaskan Mountains on the head waters of the Talkeetna River to Nenana on the Tanana River and thence to the Yukon River.

During the past summer, this commission has had in operation on both ends of the line a considerable amount of excavating machinery. On the Nenana end of the line, a Class-9½ Bucyrus dragline excavator mounted on caterpillar traction has been used for the excavation of ballast and gravel from banks and river beds. To supplement the work of this machine, a Bucyrus 18-B revolving shovel, also mounted on caterpillars was put into operation early in 1919. On the Anchorage end of the work several 70 ton Bucyrus shovels had been in use, together with a locomotive pile driver of the same make.

18-B Bucyrus Revolving Shovel, Alaskan Engineering Commission, Operating in a Gravel Pit, near Nenana, Alaska.

This article is based on figures given by Fred D. Brown, engineer in charge at Nenana covering the operation of the small revolving shovel.

In studying these figures, it should be understood that in the interior of Alaska, the frost stays in the ground well into June and in many cases it is perpetual. In fact frost is always encountered after getting a few feet below the surface. Consequently, what would be ordinary work in the states, requires blasting as though it were solid rock, in Alaska.

In endeavoring to find workable gravel pits for ballasting, occasional banks of dry gravel were found where shooting was not necessary, but as the statement given below shows, the output during the early months was frequently curtailed seriously by this condition.

Operations were commenced on May 19, 1919, and during this month, the shovel worked 12 8-hour shifts. In this time 28,064 cu. yds. of compressed sand and coarse gravel were moved. During this period a considerable amount of frost was encountered and blasting was necessary at times. The result is shown in the apparently low output of an average of about 239 cu. yds. per shift.

In June, 28 shifts were worked and 10,615 cu. yds. were moved. During 18 of these 28 shifts, the shovel was in a gravel bank without any complications from frost, but in the remaining 10 a considerable amount was encountered. The bank was about 10 feet in height, containing a large percentage of compressed sand and some loam. The average output per shift during this month showed an increase, it being 379 cu. yds.

In July conditions were better for the shovel. 25 shifts were operated and 15,315 cu. yds. were

moved, showing the considerably improved average of 612 cu. yds. per shift. The average height of the bank during this month was 7 feet and the material was gravel with a small percentage of sand suitable for surfacing the ballasting of the track.

Speaking of the value of the caterpillar-mounted shovel for this type of work in Alaska, Mr. Brown writes as follows:

"We are very well pleased with the performance of the shovel and I think that we have procured nearly all the work out of it that is possible. Of course, as we were delivering this gravel to gravel trains, there was the incidental delay. On the whole, the shovel is very satisfactory for this kind of work and the caterpillar track method of moving from place to place has proven a matter of

Class-9½ Bucyrus dragline excavator excavating gravel from a river bed for the Alaskan Engineering Commission near Nenana, Alaska

great convenience and naturally an economical feature in the operation of the machine."

Frederick Mears is chairman of the Alaskan Engineering Commission, assisted by Wm. Gerig, engineer in charge at Anchorage, and Fred D. Brown, at Nenana.

Revolving Shovel Work at Fairmont, West Virginia

Fred T. Ley & Co., Inc., Complete a 20,000-yard Job

On Feb. 1st of this year, Fred T. Ley & Co., Inc., of New York, completed the excavation on a contract with the Pleasant Valley Homes Co. of Fairmount, West Virginia, which presented some interesting excavation problems.

The contract called for the excavation of about 20,000 cu. yds. incidental to the construction of 30 multiple houses on the outskirts of Fairmont. The grading consisted of the excavation of basements and streets and the filling in for lawns, ravines, etc.

The work was mostly on a rather steep hillside. Inasmuch as the various basements and cuts were considerably scattered, this job sets forth in a striking manner the advantages gained through the use of a small revolving shovel mounted on caterpillar traction.

The equipment used besides an 18-B Bucyrus revolving shovel, consisted of six 1½-yard dump cars, about 15 dump wagons and three 18-ton locomotives. The locomotives and dump car equipment were used wherever conditions permitted. On steep grades, the wagons were employed.

18-B Bucyrus shovel, Fred T. Ley & Co., Inc., excavating in cramped quarters at Fairmont, W. Va.

Work started about Nov. 15, 1919.

The material was mostly ordinary earth with some rock. The excavated material is used for making fills around the houses and for filling in ravines and for grading the streets and the lawns.

The material was at first overcast as far as possible, but during the operation a cave-in occurred, consisting of 600 or 700 cu. yds. It was first determined to move this material out with wheelbarrows. It was finally decided, however, to do it with the steam shovel. In order to accomplish this, the shovel was pulled back in the excavation as close as possible to the upper side of the pit. In other words, the side on which it was intended to load the wagons. Although the bank was high, this was accomplished by means of keeping the shovel set on an angle as is shown in the accompanying view. By this means, it was possible to get the dipper over the wagons. This is just an example of many cases which developed where the flexibility of this type of machine showed up.

Ten men were employed on the job, including the engineers, brakemen and dump men. The cost of operation averaged about $68.00 per day, including the engine crew.

The coal which was used on the shovel was mined in open cut near the job by the Company.

The 18-B Bucyrus revolving shovel used on this work, as well as C. C. Thatcher, its operator, have quite a history. The shovel was originally owned by the Fred R. Jones Co. of Chicago. It was used for widening cuts on the L. A. & S. Railroad between Lorain and Ashland, Ohio, in 1917. On the Pennsylvania near Alliance in 1917 and 1918, and later near Indianapolis on railroad work. Just before it was taken to Fairmont, it was used in the basement job in Cleveland, described in the April EXCAVATING ENGINEER.

This shovel is equipped with a 28-foot boom and 20-foot dipper handle, both of these longer than is ordinarily furnished for a machine of this size. These features came in very handily on the Fairmont work.

Cutting Ditches to Cross Section with Dragline Excavators

I. Experience of Natomas Company of California

By R. G. Clifford, District Engineer.

MUCH doubt has existed particularly among European engineers as to the ability of the dragline excavator to cut drainage ditches and canals close to the theoretical cross section, because of the difficulty of controlling the bucket. Letters of inquiry have been sent out to various well-known contractors, asking their experience for this purpose with this type of machine. A series of articles are being prepared, based upon the answers received.

This article, by Mr. R. G. Clifford, is of particular interest as the Natomas Co., of California, 4 years ago completed levee and canal work on a 60,000-acre project, which included the construction of 26 miles of canal, 7 miles of full levee, and 26 miles levee core trench 16 ft. wide and from 6 to 10 ft. deep, all by dragline excavators.

His experience, therefore, should be of unusual interest.

A dragline bucket can be controlled almost perfectly by a skillful operator, but the presence of the teeth on the bucket prevents, of course, a perfectly even slope being made and the harder the material is the more difficult becomes the work of leaving a smooth looking slope.

On account of the fact that dragline work is so very much cheaper than any other method of excavation in large ditches and particularly those in hard material, it has been our practice in drainage work to design the section sufficiently large to provide the necessary carrying capacity with the slopes left rough. In the few irrigation ditches that have been built where a smooth slope is desired mainly for the sake of appearance the following method has been followed:

A 1½ yard dragline excavator enlarging a ditch dug by a templet excavator. No hand trimming was done. Note the character of the slope.

The dragline excavator constructs the ditch banks on lines somewhat smaller than the finished section, but carries the bottom down below the required grade. The track crew, which is idle a good part of the time when operating with a machine on wheels, spends this spare time in cutting down the banks of the ditch to true lines and spreads this material out in the deep bottom and in this way can leave the ditch smooth and true in section. Even where extra men are required to do this sloping, it is money well expended and adds very little to the unit price of the total excavation, especially in canals of large cross section.

The Future Looks Good

The United States has only 6% of the population of the world and only 7% of the land, and yet we produce:

20% of the world's supply of gold.
25% of the world's supply of wheat.
40% of the world's supply of iron and steel.
40% of the world's supply of lead and silver.
50% of the world's supply of zinc.
52% of the world's supply of coal.
60% of the world's supply of cotton.
60% of the world's supply of copper.
60% of the world's supply of aluminum.
66% of the world's supply of oil.
75% of the world's supply of corn.
85% of the world's supply of automobiles.

We also refine 80% of the copper and operate 40% of the world's railroads.

Before the war we owed nations five billion dollars. We have not only paid this debt, but foreign nations now owe us ten million dollars. We now hold the largest gold reserve of any nation in the world.

United States troops, backed by good United States brains and grit, delivered the "knockout" blow that ended the war. Don't you believe that we can successfully solve all of the problems of peace? Are you a "bull" or a "bear"?—Exchange.

The Final Flask

Pick it up tenderly,
Handle with care;
Fashioned so slenderly—
Nothing to spare.
Purchased so heedlessly,
One of a lot,
Wasted so needlessly—
All gone to pot.
Pour it most carefully,
Don't spill a drop;
Swallow it prayerfully,
It's the last sop.
Tearfully, fearfully,
All of it take
Then go and cheerfully
Jump in the lake!

Guy F. Lee
In the Chicago Tribune.

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Bradlee Van Brunt, Manager and Editor

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The Dragline Excavator

In the last few issues of THE EXCAVATING ENGINEER there have appeared a unusually large number of articles dealing with the use of dragline excavators for various purposes.

A study of these articles impresses one strongly with one predominant fact, namely the versatility of the dragline excavator.

The history of the early development of this machine is rather vague, but in searching back through old records and in questioning contractors of the old school, one learns that at the time of the building of the Hennepin Canal, a contractor on that work needed a bucket which would handle harder material than could be dug by a bucket of the clam shell or orange peel type, and one which was not limited in its range of operation to working directly under the point of suspension on the boom. To meet these requirements, this contractor designed the first dragline bucket which was operated on a stiff leg derrick, by means of a two-drum hoisting engine. It was a crude affair, but it demonstrated to this contractor and to all who saw the machine in operation, that there were great possibilities in a machine of this type. Later developments led to the designing of a machine capable of making a full circle swing. More and more improvements were made, until finally the first dragline excavator appeared. Home-made wooden construction gave way to the rigid steel design of modern excavating machinery and immediately an entirely new vista was opened to those contractors who were sufficiently far-seeing to appreciate its meaning.

The early use of the dragline excavator was, of course, small drainage and irrigation ditches, where the machine could stand on the surface of the ground and dig below, casting the material to one side. Then its value in gravel and sand pits came to be realized and finally some brave individual claimed that it could make a levee. At once much adverse criticism arose from engineers who claimed that an embankment made in such a manner would not be sufficiently well packed to prevent seepage. It took the experience notably on the lower Mississippi around New Orleans to knock this criticism on the head forever. It was found that the material dropped from a dragline bucket, made an embankment of sufficient compactness to hold the water and prevent seepage. Furthermore, this embankment could be so carefully constructed that the number of men required to trim the crown and slopes was greatly diminished.

As years went by, more and more uses presented themselves. Railroad construction, general contracting work of all sorts, work in a wet clay pit, stripping overburden from iron ore and from coal, mining iron ore and gold, and even excavation in rock quarries as well as numberless other purposes. In fact we have now been brought to the realization that this machine has perhaps a wider range of usefulness to the contractor than any other type of excavating machinery. The successful application of caterpillar traction to this machine has extended to an even greater degree its scope of application.

In the April issue, an article was published on the use of a large dragline excavator on a comparatively small job. The justification of its application being the fact of its ability to dig deep and narrow excavations from the surface in which it is impossible to put a small shovel. We learned also from another article how it can be used for stripping coal with success almost as great as that attained by the well-developed type of coal stripping shovel.

In this number we learn how a gravel pit operator in Texas solved the problems of a flooded pit with a dragline excavator, and how a contractor in Indiana moved his dragline on to a job and operated under apparently unsurmountable difficulties.

We will be told in another series of articles, by contractors and engineers of many years of experience, how it may trim slopes of drainage ditches with such great nicety and exactness that hand trimming, in order to bring the slopes within the theoretical cross section, is unnecessary.

The point of this editorial is simply to impress upon new contractors as well as upon those older ones who have been wedded through many years, to certain rigid methods and equipment, the remarkable versatility of this machine.

· FIELD NOTES ·

WE will publish in this column suggestions as to the operation and upkeep of excavating machinery or kinks and short cuts developed by the man on the job. Discussion is invited. Address Field Note Department, Excavating Engineer, South Milwaukee, Wisconsin.

Hints for Ordering Repair Parts

In the EXCAVATING ENGINEER for April, there appeared an article under this heading, in which the suggestion was made that much time and expense could be saved in ordering repair parts, if the name for the part given in the manufacturer's repair part catalogue were used, instead of a name originating in the field.

The importance of this can hardly be overestimated. For example, the term "wrist pin" is used in some localities to designate a cross-head pin. In others it means a crank pin. The term "dutchman" has also various applications. Some refer to a cylinder head and others a key or a shaft.

It can be seen from the above that the failure to observe the above mentioned rule is likely to result in annoying delays, perhaps in the shipment of the wrong part and very likely in needless expense and correspondence. Consequently, in ordering repair parts, don't use the name that you have been accustomed to. Always refer to the repair catalog, in order to be certain that the proper name is used.

Crossing Under Low Wires

Here's a simple kink that may not have occurred to some operators of small shovels.

If you are moving your shovel through city streets and come across a low wire which the boom can't clear, take a piece of plank ten or twelve feet long, set it on the point sheave, get under the wires with the outer end of plank and using the sheave as a fulcrum pull down on the inner end, thus lifting the wires. Then move your shovel ahead and let the wires slip along the plank.

Digging Out Boulders

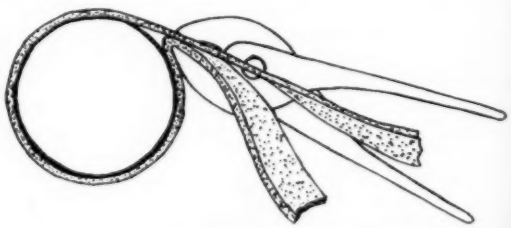
When a boulder is encountered in earth, it is a temptation to "let 'er have it," and try to rip it out without digging around it first. The sudden strains of this kind of digging are tremendous. It is far better to dig the loose material from around the boulder, and then go to it.

The use of the boom engines is one of the great secrets of this kind of work. If you can't get your teeth under a boulder, it is a waste of time to try to push it out, because the push that can be exerted is not in an effective direction. It is always better to take extra time to dig around, until it is possible to get a hold underneath with the teeth. It will be found that no time will be lost in so doing.

A Handy Wrench Kink

By W. F. Schaphorst

This sketch illustrates how easy it is to make a good pipe wrench out of a leather strap and a pair of pliers. Wrap the strap around the pipe, as shown, and grasp both ends close to the pipe with the pliers. If it is desired to tighten the thread turn clockwise as in the sketch. If the thread is to be loosened, simply pull the other way just as in the case of a pipe wrench. This idea is of special value where the pipe is nickeled and must not be scratched as the leather forms a cushion between the pliers and metal. If it is thought that a single thickness of leather will not be strong enough it is a simple matter to use two thicknesses or more. Thus the method really has no size limit, provided one has a strap that is long enough. What is more, the strap needn't be leather. Any strong, flexible material will do—even rope.



To be sure, a regular pipe wrench is better for actual pipe work because pipe wrenches are made specially for the purpose, and one can more easily develop a powerful twisting movement through the handle of a regular wrench. Nevertheless, it is well to know about this kink, as we often find ourselves confronted with a job that we think needs a pipe wrench, whereas with a pair of pliers and a strap handy the obstacle is easily overcome.

Property is the fruit of labor; property is desirable; it is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise. Let not him who is houseless pull down the house of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built.—Abraham Lincoln.

DEVICES YOU OUGHT TO KNOW ABOUT

Blasting Channels When Digging is Impractical

By E. R. Jones

One of the plants of the American Brick Company is located in Connecticut between Berlin and Hartford.

The Brick Company wanted a larger channel to carry water into their plant. If they could get it, it would enable them to do away with one of their pumps, thus saving considerable expense. It was necessary to have a channel 530 feet long through a tangle of underbrush.

The soil was quicksand and clay. Digging under these conditions was impossible. They asked me if I would attempt to blast it.

After going over the site of the channel, I saw that this would be impracticable. It is no trouble to put bore holes down in soft sticky clay and the undergrowth doesn't interfere with such work at all. Loading the charges of dynamite in these bore holes is a very simple operation. It is simply necessary to push the cartridges down into the hole with a tamping stick. No tamping is necessary because the water fills the holes and makes the best kind of tamping.

Loading in quicksand, however, is more difficult. When a hole is put down in quicksand, it immediately fills as soon as the bar is withdrawn. The strip of quicksand measured about 35 feet across. I had to make tin tubes the shape of torpedoes and about a half an inch longer than a stick of dynamite. Cartridges were encased in the tin tubes and then pushed down into the quicksand to the required depth.

The charges were spaced about two feet apart both in the quicksand and in the clay. In one hole, the charge would consist of a cartridge and a half of dynamite; the next hole, one cartridge; then a cartridge and a half and so on alternately down the line. The cartridges were put down to a depth of about two and one-half feet. The resulting shot gave us a ditch about three feet deep and six feet wide.

The publication of this matter should be of value to contractors and engineers. I find that very few of them know anything about using dynamite for ditching. General contractors know very little about it. Yet both contractors and manufacturers frequently have water problems similar to this one which they have great difficulty in handling by ordinary methods and with ordinary ditching and dredging machinery. Oftentimes a little dynamite and a knowledge of how to use it would save them a great deal of time and money.

TRADE NOTES

The general offices of the Chicago Pneumatic Tool Co. have been transferred to the Chicago Pneumatic Bldg., a new 10-story structure erected for the exclusive use of the company at 6 East 44th St., New York. The Chicago district sales branch, previously in the Fisher Bldg., has been moved to new quarters at 300 North Michigan Blvd. The Chicago service branch, formerly at 521 S. Dearborn St., has been consolidated with the sales branch at the new address. The Chicago branch is under the direction of J. L. Canby, district manager.

The Locomotive Crane Co. of America has removed its offices from 36th St. and Ashland Ave., Chicago, to its new plant at Champaign, Ill.

The T. L. Smith Co. has established a New York branch office and warehouse service station. The office, which is located at 50 Church St., New York City, is in charge of E. R. Marker, former sales manager, and will supply all the territory east of Cleveland.

REVIEW OF BOOKS and CATALOGS

We shall be glad to review, in this column, such books and catalogs as are sent to us. Books reviewed in these columns will be supplied by The Excavating Engineer Publishing Company at the price named.

NEW SULLIVAN BULLETINS: The Sullivan Machinery Co., Chicago, Ill., have recently issued the following set of bulletins, describing their product. Size 6 x 9:

Portable Air Compressors—Bulletin 75-T, describing Class WK gasoline engine driven portable air compressors, wagon-mounted, designed primarily for the operation of drilling tools, for rock removal in highway construction, including cutting of trenches and sewers, water and gas mains, the drilling of ledge rock in grading, block holding boulders, etc. 7 pages illustrated.

Sullivan Valveless Stoping Drills—Bulletin No. 70M, describing new stoping drills, Class DT-44 and Class DT-42. These drills contain the following features: Light weight and small size to permit easy handling in high stopes. Automatic rotation, a water jet for laying the dust when drilling in sulphur bearing ores. Automatic lubrication. Thoroughly illustrated and described. 16 pages illustrated.

Sullivan DX-61 Water Hammer Drills—Bulletin 70-I. A powerful machine, adapted primarily for tunnelling and for heavy work in mines, capable of drilling to a depth of 14 ft. without difficulty. 4 pages illustrated.

Sullivan WA-6 Air Compressors—Bulletin 75-P describing single-stage steam-driven straight-line air compressors. Built for standard pressures in capacities of 100 to 500 cu. ft. of pure air per minute. 8 page illustrated.

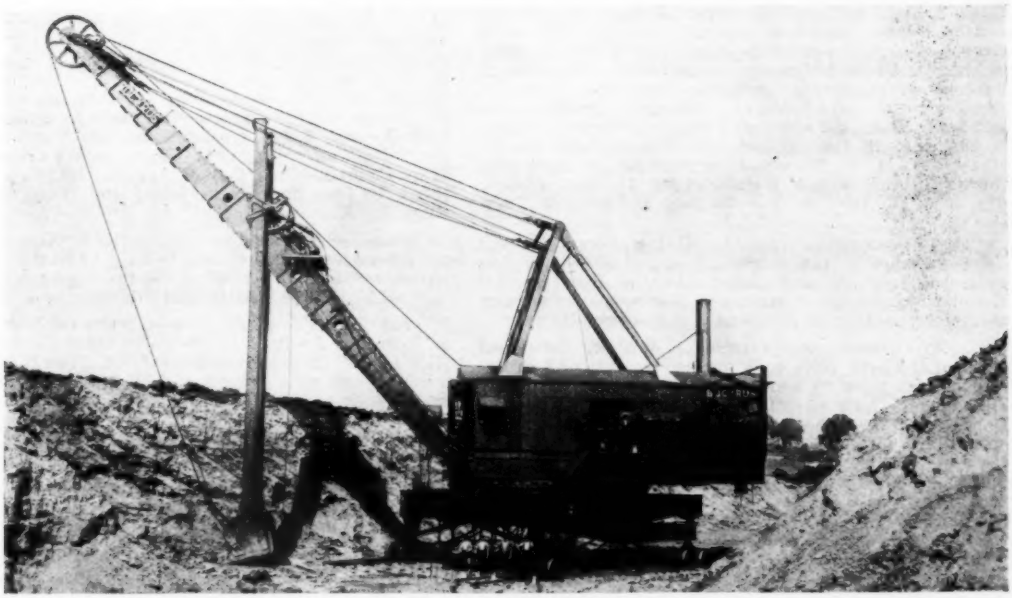
Sullivan Utility Forge Hammer—Bulletin No. 72-D operated by compressed air or steam for duty in mine, quarries or contract blacksmith shops. 8 pages illustrated.

SULLIVAN MACHINERY CO.
122 South Michigan Ave.,
Chicago, Ill.

Excavation work under way for Cleveland's new $10,000,000 Union Station which is to be located on the square adjacent to the new Hotel Cleveland. The shovel shown in the above photograph is the Walsh Construction Co.'s 70-C Bucyrus, commencing work for the Nickel Plate Railroad at 34th St. Shovel is excavating for additional passenger tracks.

103-C Bucyrus Steam Shovel stripping the overburden from ironstone for the Oxfordshire Ironstone Co., at Banbury, England. The ironstone is in a strata from 6 to 12 feet deep. The shovel loads the ironstone after stripping the overburden.

103-C Bucyrus Steam Shovel Loading Slag for the Furness Ship Building Co., Ltd., Harverton Hill-on-Tees, England. The shovel shown in the background is a Ruston-Proctor Steam Navvy.



225-B Bucyrus Revolving Shovel uncovering an iron deposit for the Cranford Ironstone Co., England.

SHOTS FROM THE · FIRING LINE ·

Arizona

Bisbee News

BY JOHN MILLER

The 88-C Bucyrus shovels at Sacramento Hill are making good progress. They are at the present time digging very hard rock which in the opinion of old timers, who have seen service on the Panama Canal, is about the toughest digging they ever encountered. The ore here is very high grade. The shovels are all engaged in stripping and have altogether about 200 ft. more before they hit the main body of the ore.

News has been received from Los Angeles that Case Sweet, one of our brothers, died on April 13th. Sweet was an old time operator, very well known in Chicago. The cause of his death is as yet unknown at Bisbee.

Oscar Burke was injured recently on a boom engine and nearly lost his thumb.

Notes from Sunny California

BY C. W. WHITNEY, SAN FRANCISCO.

J. L. Shary, who has been running a Lidgerwood dragline for the Ajax Dredging Company, has recently taken a position with the Ross Construction Company, Sutter City, and is operating their Class-14 Bucyrus dragline on the Sutter Basin work.

Snow Mountain Water and Power Company of San Francisco is engaged on a big project on the Eel river in Lake and Mendocino counties. They are building a concrete and hyraulic fill dam, W. A. Kraner of San Francisco being the contractor. The dam will store approximately 215,000 acre feet of water, and approximately 15,000 hp. will be developed at the power plant. The diversion works comprise a tunnel 5,700 feet long, and a riveted steel and wood pipe line. The Company plans to supply water ultimately to the cities of Richmond, Berkeley, Oakland, and Alameda, also other cities en route, the main pipe being approximately 120 miles long and terminating in a number of reservoir sites situated in or near the cities mentioned. Mr. Kraner, with his engineer, Mr. M. H. Slocum, have ordered for their dam work, a Pawling and Harnischfeger 1½-yard electric dragline. On the tunnel work they are using a Thew shovel.

Carl Leonardt, President, Southwestern Portland Cement Company, Los Angeles, made us a visit in San Francisco recently, and stated that the Bucyrus 68-C shovel which he has operating at Victorville was giving absolutely no trouble and was doing splendid work.

J. T. Cornwall, Santa Barbara, and our old friend Richard McCarty, have gone into partnership and expect to engage in work in Santa Barbara and vicinity. They already have an interesting contract at Naples, for the Doheny estate, which consists principally of leveling some of the hills to afford an unobstructed view of the ocean for the residence. Mr. McCarty has recently been working for W. H. Russell and Bruce Markle at Jerome, Arizona, with a 14-B on a section of the State highway. We are very glad to welcome him into the fold of the contractors, and are confident that he and Mr. Cornwall will make a success of their work.

The Board of Supervisors of San Francisco is considering the completion of the Sky-line Boulevard, and the reconstruction of the Dumbarton bridge project by which a direct highway across San Francisco bay will be opened up between San Francisco and all the central portions of California.

F. G. Rolandi, of San Francisco, has been awarded a contract for the construction of the Martinez-Dublin highway, by the Contra Costa Board of Supervisors. The highway will be twenty miles long and the contract will amount to over $400,000.00. The Supervisors also approved plans and called for bids on other sections, namely: Franklin Canyon to Hercules, 8 miles; Bryant to San Pablo dam, 7 miles; and Bay Point to Avon, 3 miles. According to the construction program adopted by the Board of Supervisors, the County will expend $2,600,000.00 this year for highways.

Engineer Chris Jensen, Fresno, reports that work on the $500,000.00 highway system, Fresno County, is progressing satisfactorily.

Bates & Borland, Oakland, have been awarded a 7-mile section of the Alameda Co. highway between Oakland and San Francisco, known as the Mount Eden cut-off. The contract price is $206,400. Bates & Borland are also very busy with their large contract for the Standard Oil Company at Richmond, where their 18-B, under Jim Monihan, is very busily engaged in preparing a site for a large addition to the refinery.

The State Reclamation Board has approved the plans of District 2021 for completing its plans for reclamation in the Mildred district, San Joaquin County. The work includes the levee system, drainage canals, and the installation of new pumping facilities, costing upward of $300,000.

Recently bids opened by the California Highway Commission on six new units of the highway, involving about 90 miles of pavement, indicated that the engineer's estimates are still below the fair offerings of the bidders. The estimated expenditure is more than $1,000,000, but in only one case, namely, 10 miles of road between Woodland and Zamora did the bid run under the estimate, the bidder being George S. Benson and Sons of Los Angeles. In many cases the proposals so far exceeded the official estimate that it is probable all the bids will be rejected. The lowest bids on other sections were as follows: Humboldt County—P. L. Burr, San Francisco, Shasta County—Guy T. Atkinson, Portland, Oregon; Santa Cruz & Santa Clara Counties—J. L. Connor, Los Angeles; Fresno County—J. G. Donovan, Los Angeles; San Diego County—Riley & Peterson, Calexico.

The Harbor Board of Los Angeles is planning to call for a bond issue of $1,452,000 in July, to be used to repair jetties, bulkhead a portion of the turning basin, dredging channel No. 3, and considerable other work.

San Francisco Bridge Company was the lowest bidder on hydraulic dredging in the Sacramento river near Dos Rios Island, on Government contract. The bid was 6.45 a cubic yard, with a total of $387,000 for the estimated 6,000,000 cubic yards of dredging, based on the supplying of fuel oil by the Government.

Some very interesting construction projects are indicated by recent application to the State Water Commission, for permission to divert water. Among these projects may be mentioned the following: River Farms Company, ditch 5 miles long, estimated cost, $14,000; Merced Irrigation District, canal 13½ miles long, earth dams, etc., for storage of 200,000 acre feet and irrigation of 173,000 acres; Lars R. Jorgenson, 15 mile canal, concrete dam, of 100,000 acre feet, also another project, 10 miles of canal, concrete dam, storage of 108,000 acre feet; Yuba-Nevada-Sutter Water & Power Association of Grass Valley—21 mile canal, and hydraulic filled dam, also concrete dam, estimated cost $1,800,000.

UMI

California

San Joaquin County Notes

We are in receipt of a letter from Arthur W. Ladd of Tracy, stating that he has leased 320 acres in the neighborhood of this town and is raising barley. He, however, still hankers for a sight of a steam shovel. Mr. Tracy has recently been demobilized from the army, having served with the 19th and 35th engineers for 13 months in France. He writes in part as follows:

"I was first assigned to the 19th Engineers at Nevers, France, in Company U. We were repairing some of the old Belgian locomotives the U. S. Government bought from them. Later I was transferred to Co. G, 35th Engineers stationed at La Rochelle, building the box cars that carried the little U. S. A. sign on them. We turned out in the neighborhood of 26,000 of them. The cars were of 33,000 capacity and as far as I saw the only up-to-date cars in Central Europe. I was in France a few days short of 13 months."

He gives us the following news as to doings in the vicinity of Tracy:

There are several irrigation projects going on with elevating graders used for building laterals, in this vicinity.

Moreing Bros. of Stockton have a few small jobs grading highways and gravel.

J. E. Johnston of Tracy has several jobs of grading and is using three new White Trucks.

The River Rock & Gravel Co. of Tracy are operating a Bucyrus electric dragline and a 70-C Bucyrus electric shovel in their plant.

All told there are three counties in this vicinity about 40,000 acres of land under irrigation. Some finished and some just started. Most of the laterals leading away from the main canals are put in with Fresno scrapers and elevating graders with teams or by caterpillar tractors. The laterals are on an average of 4 ft. deep and 6 to 8 ft. wide at top. He believes that these laterals could be dug with greater efficiency and less waste with machines that work closer to the boundaries.

John Hayes, Los Angeles, has been awarded contract for the construction of the Second St. tunnel at a cost of $995,773.

Canada

Montreal and Vicinity

BY B. ST. JOHN.

In addition to activity among contractors, there are other signs of spring in Montreal.

Six months accumulation of filth on the streets is beginning to show its true colors. It has been camouflaged to look like snow.

Last fall's crop of fish stories, caught by an early fall of snow, are being dug up—beats all how fast fish grow during the winter.

The man who first said "Life is just one damned thing after another," said a mouthful. All winter we have had some job digging up to pay coal, grocery, meat, clothing, doctor and other bills, all the while hoping for an early spring, and now the millinery store windows seem to have alienated our wives' affections, visions of more bills are disturbing our sleep. Still we can manage to twist our faces into a sort of smile when we see in these store windows, signs reading, "Bare shapes two dollars and up."

Still there are some real smiling faces to be seen. The wives of contractors, steam shovel stiffs, dinkey and mule skinners, supes and walking bosses and several other kind of mud-wallopers are beginning to lift the corners of their mouths and show other signs of spring. Soon they will be wearing with other attrictive raiment, that smile that won't come off until next fall, when the old man will show up again and proceed as per usual to make the house look and smell like a camp, kick about everything in general and add to little Johnny's stock some brand new cuss words.

Canadian Contractors are beginning to talk of going to France and the possibilities of getting some good contracts there. We understand that France is in a bad way on account of the damage done to property and the great need of an increase in population. We wonder if they have long cold winters there, and if these contractors would lay around the house all winter as they do here, if so, France need not worry about the increase in population.

Equipment salesmen are beginning to show signs of almost human intelligence. Some of them have even taken their feet off the desk and started to trail contractors, which is much easier in these days of "private stocks." The mule and whiskey scent is easy for a machinery peddler. We are not sure if they are trailing them to make a sale or to find the "private stock." In any event we are glad to get them out of the office, open up the windows and let in the spring air,—a genuine blessing.

We are watching for the return of the birds who leave here every fall for the South, some of our bird lovers claim that a great many species of birds, once plentiful here, have about disappeared and new species appearing which are hard to identify, as they appear to be a mixture of several species, while all of them seem to have longer legs and fewer feathers—just as though their legs had been pulled and they had been plucked. Oh, you Sunny South.

Trappers are getting their traps ready to catch skunks, whose fur has become so valuable. Once these animals were plentiful in Canada and every farm had its skunk den, with the usual vile odor, which protected them from harm and drove other animals away. A few years ago this little animal began to disappear until they have become very scarce. An old trapper and guide says, that the advent of some stronger animal must have driven them away. I wonder if the following from a New York paper has any connection:— "Canada has become an important market for American Machinery, American Manufacturers have sent a small army of salesmen into Canada in the past few years. A great many of these have become permanently located there." There may be some truth in the statement of a Canadian Private who fought at the Dardanells, that the Regimental Mascot, a Billie Goat, fainted when he got his first whiff of a bunch of Turkish Prisoners.

Anyway, one of the most noted Canadian Contractors, a famous General, who spent four years in France and passed through several bad gas attacks, recently wanted some equipment, immediately a horde of equipment salesmen swarmed into his office, although the General made use of the Gas Mask he wore during the war, he came nearer passing to his reward than at any time in France. He hopes to be able to resume work when the frost goes out of the ground.

Winnipeg and Vicinity

BY DOMINION EQUIPMENT AND SUPPLY CO., LTD.

Mr. John McCallum, superintendent of steam shovels for the Canadian Pacific Railway, has just finished overhauling twenty-eight machines preparatory to the coming season's work.

Slipping on a wet pavement recently, Mr. W. Williams, assistant superintendent of steam shovels, Canadian National Railways, had the misfortune to break a rib, but at present is doing well and will soon be on the work again.

Mr. McBeth, Supt., for Carter-Halls Aldinger Co., has added the shovel equipment to the Bucyrus 35-B hitherto used as a crane. This machine is to be used on the stream diversion work by the Canadian National Railways at Wayne, Alta.

Winnipeg city building permits for the first three months of 1920 exceed the total for the whole year 1919.

The National Resources Department of Canadian Pacific Railway is contemplating extensive irrigation work in the West this summer.

Work on the new Welland Canal, which will provide a 25-ft. waterway between Lakes Erie and Ontario, is apparently to be resumed by the Canadian government. During the war all operations on the canal practically ceased and last year an effort was made to get together machinery and to clean up preparatory to resumption. It is now announced that $5,500,000 has been spent in the Dominion estimates for the current year, which means that it is the intention of the government to go ahead with construction.

The Pacific Construction Co. has been awarded the contract for a portion of the Canadian Pacific Railway at Vancouver, B. C. The work will cost about $3,000,000.

Marsh-Bourne Co. of Seattle, has been awarded the contract by the British Columbia Public Works Depart., Victoria, B. C., for Sumas Lake Drainage Project, involving an expenditure of $1,260,000.

Vancouver Notes

BY BROWN, FRASER & CO., LTD.

A. M. West, City Engineer of North Vancouver, B. C., has resigned in order to enter business on his own account. Mr. West's resignation will take effect April 15th. J. W. B. Blackman has been appointed as his successor.

Local Board of Trade, Burnaby, B. C., is urging the Provincial Government to proceed with paving as much as possible of the Riverway this year. The government has also been urged to complete the paving of the Hastings-Barnet Rd. this year. Minister of Public Works, Hon. J. H. King, Victoria.

Estimates of F. L. Fellowes, City engineer, for this year, include $258,500 for road construction work, $35,000 for work on bridges, and $25,000 for repairing macadam streets.

Dominion government is being urged to extend the C. N. R. from Calvary to Red Reer this year, charter for which has been granted and bonds sold.

The B. C. Electric Railway may build a line from Cloverdale to Blaine and to White Rock, a distance of 10 miles. Company also plans to double track Victoria Road.

Improvements aggregating more than $100,000, are being made by the B. C. Electric Railway Co. to its Fraser Valley line to Chilliwack.

A bill to authorize the government to borrow $4,000,000 for the completion of the P. G. E. to Prince George, which it is hoped to accomplish this year, was brought down by Hon. John Hart, minister of finance.

L. A. Biggar, a Montreal metallurgist, is considering the establishment of an ore testing plant near Nelson, B. C.

It is reported that the Dominion Department of Public Works wil soon commence the construction here of a federal government building at a cost of $1,000,000. Secretary R. C. Desrochers, Ottawa.

Grand Trunk Pacific Railway will spend $150,000 this year on the erection of a tourist hotel in Jasper Park.

Cranby Consolidated Co. contemplates erection of a concentrating plant at the Hidde on Creek mines.

Ernest Smith of Edmonds, B. C., has been appointed municipal engineer of Burnaby, B. C. There are five applications for the position.

The C. P. R. has formally approved the plans for the Johnson Street bridge at Victoria, B. C. Subsequently they must be endorsed by the Federal Public Works Department and by the Board of Railway Commissioners. The city council will probably have to wait until July before it is in a position to call for tenders.

It is reported that a large British iron and steel company will establish a plant in British Columbia. The company will be capitalized at five million pounds sterling, and will work her with an established coal company having rail and water connections. Native ores of British Columbia are to be utilized.

Henry J. Cambie, chief engineer of the Esquimault & Nanaimo Railway, has retired from active work at the age of 84, and after a railway engineering career of more than 60 years. Mr. Cambie was born in 1836 in Ireland. In October, 1852, he entered the engineering office of the Toronto & Guelph Railway, which was later absorbed by the G. T. R. From 1853-9 he was with Gzowski & Co., contractors on the G.T.R., and for the two followings years he explored Northern Ontario and surveyed land for the provincial government. From 1863-9 he surveyed for the Intercolonial and Annapolis railways, and from 1870-3 was engaged in Intercolonial Railway construction. In 1874 and 1875 he was engaged in land surveys in British Columbia and for the following four years was in charge of surveys in that province for the C.P.R. From 1880-3 he was in charge of C.P.R. construction in the Fraser River canyons, and in the following two years he built the Savona section of the C.P.R. From 1886 to 1903 Mr. Cambie was in charge of maintenance of the main line and all branches of the C.P.R. in British Columbia. From 1905-7 he supervised the construction and maintenance of subsidiary lines, and since 1908 he has held the position from which he now retires. Mr. Cambie is a member of the Engineering Institute of Canada and of several other societies, and upon five different occasions he was elected a councilor of the institute.

Two extensions of the Kettle Valley Railway will materialize as the result of a conference between the provincial cabinet and Mr. J. J. Warren, general manager of the line. One spur track is to connect Coalmont with Granite Creek in order to provide access to a coal mine at the latter place. The other extension will connect Penticton with the soldier settlement area at Osoyoos. Legislation to cover both extensions will be prepared at once and introduced to the Legislature during its present session.

Florida

Commissioners of Duval, Baker and Columbia Counties have let contract for building 54 mi. road, involving 507,000 sq. yd. vitr. brick and 570,240 lin.ft. concrete curbing to H. Y. Wilson, Clark Bigd. The cost will be about $2,000,000

Illinois

Chicago and Vicinity

BY H. M. SWIGART.

Mr. C. J. De Frees has his new Bucyrus Class-10 Caterpillar dragline working at Hubbell, Ind.

Mr. J. V. Poole, County Engineer at Madisonville, Ky., says there is a great deal of drainage work to be done. Most of the work will be let this spring. There is also extensive road work to be done by the county.

Mr. Ben Hibbs, well known dragline operator, is also working for the county.

Mr. A. F. Schmitz of the Minooh Gold Dredging Co. Rampart, Alaska, called here recently. He has a 3½-ft. Bucyrus dredge being overhauled in Seattle. This will be moved to Alaska about June 1st. Mr. Schmitz started to pan gold in 1897.

Mr. Jack Vott, well known operator of large revolving shovels, is now with the Brownlee Park Gravel & Material Co., Battle Creek, Mich.

A great deal of road work in Kentucky and Iowa has been postponed on account of high prices and scarcity of material and equipment.

Leach Bros., Jr., Golden Gate, Ill., was the only bidder for cleaning out main ditch in Litch and Grover Drainage District No. 1, Fairfield. Length of ditch 4½ miles at $7,500.

Indiana

John McInerney, after spending 18 months in France, is back in the contracting business again. He has a season's job with the Studebaker Motor Co. grading property in South Bend, Ind. His address is 129 St. Joseph street.

Iowa

Around Des Moines

BY BRUCE P. SMITH.

Frank Cram & Sons of DesMoines have been awaiting a contract for grading 5th St., Des Moines, which is one of the largest grading contracts ever awarded in this city. About 160,000 cu. yds. of excavation is involved.

J. C. Parquette is grading a new boulevard into Grand View Park, Des Moines. This is being done with a 14-B Bucyrus caterpillar shovel.

Scott County has let contracts for grading and paving 447 mi. Davenport-Durant Rd. and 5.38 mi. Davenport-Gambril Rd. to McCarthy Impvt. Co. 220¼ Main St., at $267.952 and $357,034 respectively; 6.44 mi. Harrison St. Rd. and 5.42 mi. Davenport-Princeton Rd., to Central Eng. Co., 711 Putnam Bldg., at $435,292 and $330,793 respectively.

R. A. Gardner, auditor of Lee Co., received no bids March 16, completing ditches in Green Bay Levee and Drainage District, involving 108,000 cu. yd. excavation. E. T. Perkins, 1211 1st Natl. Bank Bldg., Chicago, engr.

Kansas

Pittsburg and Vicinity

BY A. M. NIELSEN.

The Domestic Fuel Company of Pittsburg have purchased a new Bucyrus 225-B to be put to work about the 15th of August, and good many of the operators are looking forward for this new shovel to come into the field with all the latest improvements on it.

The Leavell Coal Company of Tulsa, Okla., also bought a 225-B which will have some ideal digging in its new home near Tulsa, and we can expect to have wonderful records from this plant as soon as they get started, as it is without a doubt a mighty good stripping proposition.

The United States Coal Company received a new Bucyrus Coal Loader recently. Mr. Phillip H. Rouse, a well known erector from the Bucyrus Company, erected it. While here he met some of his old friends, who were all delighted to see him. Certain amusing remarks were heard while Mr. Rouse was here in Pittsburg from some of his friends such as, "Why Hello Phil, aren't you dead yet!" Of course we all have a certain individual way of expressing our delight in seeing old friends.

A committee has been appointed by Governor Frederick D. Gardner of Missouri, to organize a campaign for a constitutional amendment for a $6,000,000.00 bond issue for good roads, and we are all wishing this committee the best of luck and success. Missouri needs good roads as well as Kansas.

Louisiana

State Highway Dept., New Orleans, La., are constructing 10½ miles of roadway from Tallulah to Lake Providence; $133,192; Francis C. Constant, Alexandria, La., is the contractor.

Massachusetts

The State Highway Commission, State House, Boston, let contract for building 16,000 ft. bituminous macadam road and concrete bridge, Huntington Twp., involving 11,859 cu. yd. earth and 1,200 cu. yd rock excav., 34,200 sq. yd. bituminous macadam, 630 cu. yd, concrete, 7,000 lin. ft. piling, 8,000 cu. yd. stone fill, 610 cu. yd. rock embankment, 2,000 cu. yd. bridge excav., to Cordner & Montague, 373 Bay St., Springfield, $182,232.

Minnesota

Northern States News

Morris & Dougherty Company, Globe Building, St. Paul, Minn., have received contracts for bridge approach work on the Soo Line. One of these contracts is near Beverly, Wisconsin, between Ladysmith and Duluth, and comprises approximately 130,000 yards. The second contract is at Blackhoff, Minnesota, about thirty miles south of Duluth, and comprises about 90,000 cubic yards of fill.

J. J. Litcher, Lewiston, Minnesota, was the successful bidder on Federal Aid Project No. 8, State Road No. 1, let at Winona, Minnesota, on March 25th. This work comprises 9 miles of grading amounting to approximately 100,000 cubic yards. Other bidders were S. J. Groves & Sons, Minneapolis, A. Guthrie & Company, St. Paul, Fulton & Nelson, Minneapolis, and Funk & Rasmussen, La Crosse, Wisconsin.

J. A. Myron of Redwood Falls, Minnesota, has been elected road engineer of Murray County, succeeding P. L. Minder, who has been elected to a similar position in Rock County, Minnesota.

W. J. Walsh, street engineer of Minneapolis, advises that nearly $500,000.00 will be spent by this city this year for good roads. The fund available for good roads is larger this year than ever before, he advises.

All bids received by Morrison County for road construction work on March 31st for the construction of Job No. 4, Federal Aid Project No. 24, were rejected and the County will do this work itself.

All bids were rejected for Federal Aid Project No. 160 and 159 received by Otter Tail County, Minnesota, on April 1st.

H. Thursdale & Company, Sauk Center, Minnesota, were successful bidders on the grading of Federal Aid Project No. 98, bids for which were received by Todd County, Minnesota, on April 5th. E. M. Barg of Long Prairie, Minnesota, was the successful bidder on bridges for this contract.

Getter & Eberhardt, Grand Rapids, Wisconsin, were awarded County Ditch No. 19 in Yellow Medicine County, Minnesota, on April 6th.

The successful bidders on Federal Aid Project No. 28, bids for which were asked for by Grant County, Minnesota, on April 7th, were Clear & Company of Herman, Minnesota. T. T. Stuverud of Elbow Lake, Minnesota, will furnish the concrete culverts.

C. H. Windsor, Montevideo, Minnesota, was low bidder on road work let at Marshall, Minnesota, on April 2nd.

We are advised that Mr. F. A. Mengel has returned to the employ of the Winston-Dear Co. at Hibbing. He left the Coast the first week in April with Mrs. Mengel and expects to be at Riverton. The Winston Co. evidently couldn't get along without him.

S. Nelson, auditor of Kandiyohi Co., Willmar, rejected bids received Feb. 9, for paving 11 mi. Federal Aid Project 31, State Rd. 6, 18 and 24 ft. wide. About $300,000.

B. Y. McNairy, auditor of Morrison Co., Little Falls, rejected bids received March 31, for building 8 mi. Federal Aid Project 24, Job 4, 24 ft. wide. About $26,000.

Mississippi

Franklin County Supervrs., J. M. Reynolds, Clerk, Meadville, are constructing 80 mi. gravel roads; $400,000

available. The contracts were let to Jones-Miller Construction Co., Crystal Springs, Miss., and J. R. Parker, Lyon, Miss.; other contracts let for 40 mi. road; Geo. C. Hoskins, Engr., Meadville.

Missouri

The Land and Sampson Construction Co., of St. Joseph, were awarded contract for dredging operation in Platte River Drainage District No. 1; work includes the deepening and straightening of channels in said river.

Commissioners of Buchanan Co. have rejected bids received March 19, for building 11.2 mi. of Jefferson Highway, 30 ft. wide, involving 45,242 cu. yd. earth excav.

The L. J. Smith Construction Co. of Kansas City have been awarded another big trestle filling job on the White River branch of the Missouri Pacific R. R.

Nevada

In spite of snow and storms, highway construction in Nevada has been proceeding. Niedo & Gavin of Reno have been pushing work on the Washoe Summit Steam Boat Springs Road with a Marion shovel during the past winter. This is a section of the Reno to Carson City project, calling for about 5 miles of loose rock grading. Water for the steam shovel had been hauled about 2 miles in tank wagons and when it reached the job it was necessary to inject live steam into the tanks to melt the ice.

The contract for constructing a portion of the State highway from Cottonwood Creek to a point 9.33 miles north, on the west side of Walker Lake has been awarded the Nevada Contracting Company of Fallon, its bid of $166,689.00 being the lowest. A part of this road will have to be blasted from the solid rock wall rising perpendicularly from the water's edge.

Ohio

Cleveland and Vicinity

BY E. G. LEWIS

Work has been started on a five million dollar plant for the Fisher Body Ohio Company in East Cleveland. Excavating is being done by Fred R. Jones, who is employing two 14-B Bucyrus shovels.

The Ten Mile Creek Sewer, bids for which were opened at Toledo, Ohio, on March 24th, was awarded to Harris & Tansey, of Toledo.

The Nickel Plate Railroad is carrying on quite extensive work along their main line through Cleveland, which is in connection with the new Union Depot work.

Plans for a new subway to extend from the Public Square at Cleveland, to East 40th Street, and to cost approximately thirty million dollars are now under way.

The Uniontown Coal Company, of which J. C. Irwin is vice-president and general manager, have taken over the property of the Industrial Coal Company, at Uniontown, Ohio. Mr. Chas. Wenner is superintending this operation.

Bids were read at Columbus on March 26th, on 12 Ohio State Highway jobs, but the scarcity of bidders prevented any awards.

C. O. Beckett, who formerly operated a 14-B Bucyrus for the Ayres Mineral Co., is now local superintendent at the New Lexington Sand Pit of this Company.

Oregon

Northwestern Notes

BY L. T. RUSSELL, PORTLAND.

Palmer & McBryde have under way a large highway job in Del Norte County, and also a considerable job of paving near Oakdale.

The United Verde Copper Company, Jerome, Arizona, are engaged in stripping some five million yards of rock in connection with their proposed pit mining for copper. They have one Marion Model 300 revolving shovel, one Osgood Model 120, and have ordered a second Osgood 120 for this work. Mr. E. E. Van der Hoef is manager in charge of stripping operations.

Bruce Markle and W. H. Russell are busy on highway construction near Jerome, Arizona, and are making fine progress.

The Imperial Irrigation District, at a recent meeting, adopted a resolution putting before the voters of the district, a measure calling for a five million dollar bond issue, to start construction on the first leg of the All-American Canal. Drainage of water-logged land will also be started as soon as funds from this bond issue are available.

The Phelps-Dodge Corporation, Bisbee, Arizona, are making good progress on their work of removing Sacramento Hill, in order to carry on the pit mining of copper ore that lies near the surface. The writer had an opportunity of inspecting some cost charts on this work, and results shown are very satisfactory indeed, reflecting much credit on the management. Mr. George Myers is superintendent, in charge of stripping, and is assisted by Mr. James Curtin, Master Mechanic

Much interest is being taken in Irrigation work in the Southwest, and some large projects are due to be started soon.

The County Commissioners of Maricopa County, Phoenix, Arizona, are asking for bids on several highway jobs, but to date not much work has been let, owing to prices being considered rather high.

A. Guthrie & Co. have been awarded contract for constructing pier No. 5, at Municipal Terminal No. 4, Portland, at $37,865.

Pennsylvania

Pittsburgh and Vicinty

BY F. A. RUMBARGER.

Mr. J. M. Floesch, President of Floesch Construction Co., Rochester, N. Y., was in this city for a few days during the last month.

Rizzutti & Chiodo, contractors of Bradford, Pa., have a contract for building approximately 12 miles of tram road and have purchased a Bucyrus 14-B caterpillar for the job.

Jerry Byrns, shovel engineer, was a caller at our office. Jerry has been in the South during the winter months, on account of ill health. Jerry is now looking fine and is ready for another heat on one of the 225-Bs of the Wayne Coal Co.

Engineer Van Bruggle is now erecting a Bucyrus Class-24 electric dragline for the Caparis Stone Co. at Connellsville.

George W. Williams, erector for Bucyrus Co., is setting up 225-B for the Stine Coal Co.

C. P. Mayer, president of the C. P. Mayer Brick Co. Bridgeville, Pa., advises that they have about completed the coal stripping operation at Bridgeville where they are using a 225-B, and are contemplating moving shovels to other properties.

There are great activities in the coal stripping operations around this vicinity and from all indications this will continue for months to come.

H. A. Light, superintendent, Coal Land Development Co., was in Pittsburgh recently on business. Rube states that things are humming around Western West Virginia where he is now located.

Louis F. Sadler, Pennsylvania State Highway Commissioner, Harrisburg, Pa., will receive bids on May 11th, at the State Capitol, for the re-construction of 19 roads in the following counties:

Chester	Somerset
Cumberland	Susquehanna
Delaware	Venango
Erie	Mercer
McKean	Warren
Northampton	York
Schuylkill	

Bidders may secure proposal forms and specifications upon the payment of $2.50 per set on request of the State Highway Dept., Harrisburg. Each proposal must be accompanied by a certified check, payable to the State Highway Commissioner for an amount designated in the proposal for each contract.

J. R. Leonard is operating a 225-B Bucyrus revolving shovel and H. M. Chenworth a Model 36 Marion for the Stine Coal & Mining Co., Osceola Mills, Pa. J. B. Smith is superintendent.

The Thomas Cronin Company has been awarded contract for widening and improving Ohio St., Pittsburgh, for $428,152. Booth and Flinn were awarded contract for Mt. Oliver Roadway improvement at $41,338, and also a part of Bigelow Boulevard work at $80,000. The Cronin Company were awarded contract for Liberty Ave. improvements at $44,000. River Ave repaving at $40,000; M. O'Herron Company for repaving Main St. at $20,500 and Wheatland Ave. at $2,600.

Mason and Hanger Co., Inc., of Paxinos, Pa., were awarded contract to build section of Route 43 between Gettysburg and Fairfield, at $485,420, consisting of 46,150 feet of one-course reinforced concrete road, eighteen feet wide.

Southern News

BY C. N. BALLENTINE, BIRMINGHAM.

The lack of open top cars continues to be a hardship to nearly all of the operators in the road and building material field in this section.

The City of Dallas and Dallas County Improvement District No. 10, Dallas, Texas, was created recently by the County Commissioner's Court and Sam T. Morgan, Lawrence Miller and W. J. Daniel were appointed supervisors.

Mr. M. H. Edmonson, of Dallas, Texas, passed through Birmingham recently enroute to Florida to inspect some dragline equipment.

Hess & Skinner, Civil Engineers, with headquarters at Dallas, Texas, have opened District Offices in Atlanta, Georgia, Raleigh, N. C., Little Rock, Arkansaw, Amarillo, Texas and Texarkana, Ark.

The Florida Terminal Company is reported to be making good progress with their new phosphate terminal at Fernandina, Fla. The main office of this company is located at Ocala, Fla., and Mr. J. Camp is president.

Jefferson County, Alabama, has made extensive plans for the construction of highways during the present year. It is expected that work on the various projects will start in the near future.

South Carolina

Commissioners of Charleston Co. have let contract for building 7 mi. St. Andrews Rd. to Charleston Eng. & Contg. Co., 58 Broad St., Charleston, at $406,264.

Texas

Two bids for the deepening and widening of the Houston Ship Channel between Galveston Bay and Morgan's Point were accepted by the Chief of United States Engineers at Washington on April 10th. Contracts will be signed soon. The Atlantic Gulf and Pacific Co. were successful bidders on Sections 1 and 3 at 8/10c per cu. yd. and the United States Dredging Co. on Section 2 at 8 5/10c. It is said that the cost of the work will possibly approach $1,000,000.

Previous to this bids for the work of deepening and widening the channel for a distance of approximately 25½ miles were opened at the office at the Local Engineers in Galveston. This covered work from the lower end of the channel in Bolivar Roads to Station 3, a total length of 25 miles. This is divided into three sections. It is estimated that between 16,000,000 and 18,000,000 cu. yds. of earth will be removed in order to bring the channel to the average depth of 30 feet. Bidders will be required to commence work within 60 days after the approval of the contract. Work must be prosecuted at the rate of not less than 100,000 cu. yds. a month during the first 2 months and 200,000 cu. yds. a month thereafter.

Leland Hurd, formerly dragline operator, is now a First Lieutenant in charge of the Aviation Repair Depot at Dallas. He is an assistant to the Engineer Officer in charge of final air plane test and acceptance.

Cameron County Commissioners are constructing 10 miles of hard-surfaced roads; W. T. Montgomery, San Antonio, Tex., is the contractor.

Utah

The Christensen Construction Company of Salt Lake City, Utah, was the successful bidder for a 42-mile section of road in Sweetwater County and received the contract for the grading and culvert installation for $86,000.

Washington

The Board of Public Works of Seattle let contract for building a 22 mile railroad spur from Rockport through Marblemount into the Skagit River power site, to Grant Smith Co., Hoge Bldg., Seattle, at a cost of about $466,000.

West Virginia

Steel has been bought and work is being pushed on construction of the Greenbrier & Eastern R. R., to be 10½ miles long, from Rainelle, on the Sewell Valley R. R., to the head of Meadow river. Boxley Bros., Rainelle, W. Va., have the contract. John B. Laing, Lewisburg, W. Va. ,is president; W. S. Woods, Charleston, W. Va., vice-president; J. Wade Bell, Bellwood, W. Va., treasurer and secretary; Hal M. Scott, Rainelle, general manager and chief engineer.

Contract has been reported let to the Hanover Construction Co. of Philadelphia to grade extension of the Morgantown & Wheeling Railroad from Morgantown to Mannington W. Va., 30 mi. Roberts Engineering Co., Charleston, W. Va., is chief engineer.

Wisconsin

State Highway Dept., at div. office, Wilner Bldg., Green Bay, let contract to J. Young & Bro., Oconto, for grading and paving 4.14 mi. Elkhart-New Holstein Rd., Calumet Co., state aid construction.

State Highway Dept., State Capitol, Madison, let contract to M. O. Carter, Richland Center, grading and paving 3.5 mi. Richland Center-Boaz Rd., Federal Aid Project 172, Richland Co., involving 25,990 cu. yd. earth excav., $0.87½, 1,518 cu. yd. rock excav., 1.75, 383 cu. yd. concrete in culverts, $28, 92.9 cu. yd. concrete in bridges, $30, 1,146 cu. yd. creek channel excav., $1, 107 cu. yd. borrow excav., $0.90, etc., total cost, $41,304; to E. Kelley, Cazenovia, grading, paving and building rein.- con. arch bridge on 0.11 mi. Cazenovia Bridge Rd., Federal Aid Project 171, Richland Co., involving 821 cu. yd. earth excav., $0.80, 143 cu. yd. borrow excav., $1.50, 1,025 sq. yd. 17 ft. concrete surfacing, $3, 196 sq. yd. 24 ft. concrete surfacing, $3, bridge complete, $20,430, etc., total cost, $25,915.

State Highway Dept., at div. office, Stephenson Bldg., Milwaukee, let contract grading and paving 3.04 mi. Milwaukee-Madison, Rd., Waukesha Co., to Froemming Bros., 1326 Humboldt Ave., Milwaukee, $93,791; 3.02 mi. Geneva Rd., Kenosha Co., to C. Peterson, 225 Main St., Kenosha, $120,495.

PROSPECTIVE · CONSTRUCTION

Alabama

W. S. Keller, State Highway Engr., Montgomery, Ala., advises that bids will be opened on May 10 to construct 6.3 miles State Trunk road No. 15, calling for 16,389 cu. yds. sand-clay surfacing.

Arkansas

Bids will be received until 11 a. m., May 5, by Commissioners of Road Improvement District No. 1, Union County, at office of the State Highway Commission, Little Rock, for the construction of 21.5 miles of gravel macadam road and 4.17 miles of gravel macadam road for Road Improvement District No. 2.

Bids will be received until 11 a. m., May 5, by Commissioners of Road Improvement District No. 2, Union County, Ark., at office of State Highway Commission, Little Rock, for the construction of three sections of road, totaling 54.78 miles of gravel road. Ford & MacGrea, Engineers, 325-325 Gazette Bldg., Little Rock, Ark.

Bids will be received until 11 a. m., May 5, by Commissioners of Road Improvement District, District No. 3, Union County, Ark., at office of State Highway Commission, Little Rock, for the construction of three sections of road, totaling approximately 40.32 miles of gravel road. Carter & Knoch, Engineers, 803-7 El Dorado, Ark.

Bids will be received until 11 a. m., May 5, by Commissioners of Road Improvement District No. 4 in Union County, at the office of State Highway Commission, Little Rock, for the construction of approximately 68.36 miles of gravel macadam road.

The Fort Smith and Western R. R. Company contemplates an expenditure of nearly $300,000,000 for road improvements and equipment.

Baxter County Road Improvement Dist. No. 3, Will Case, Secy., Cassville, Ark., will invite new bids to grade and surface 17 mi. clay-bound macadam road; $150,000; rejected previous bids; Bird & Kiel, Engrs., 43 Moore & Turner Bldg., Little Rock, Ark.

California

Preliminary survey for the construction of the Orville Palermo Road will be made under the direction of County Road Engineer Martin Polk. Approximate cost, $50,000.

Engineer Burton Smith has prepared plans for the Melones Reservoir for the Oakdale Irrigation District; estimated cost $2,000,000.

The Board of Supervisors of Imperial Co. will soon receive bids for paving 45 miles county highway under $1,500,000 bond issue, bitulithic and concrete. Former bids rejected.

Canada

The City Council, Montreal, has voted the sum of $2,409,000 for Aqueduct improvements and preparations are being made to start the work. City Engineer Doucet and Messrs. R. S. Lea and W. J. Francis have been appointed a board of supervising engineers which will have charge of the preparation of the plans and the supervision of the work. $1,683,000 of this fund will be required for completing the aqueduct excavation.

Wabash Railway officials plan to start work soon for double tracking portions of a line east of St. Thomas. L. J. Ferriter of Buffalo is superintendent of local division.

The Alberta and Hudson Bay Railway Company will construct a line about seventy miles, to Calgary from the coal fields in the Rocky Mountains.

Colorado

This sounds like old times. Next November Colorado will vote upon an amendment to the State Constitution, authorizing the construction of three tunnels through the continental divide and providing for an issue of bonds for this purpose. The State Railroad Commission has passed upon this plan. Tunnel is near James Peak in northwestern Colorado, 6¼ miles in length. One at Marshalls Pass in mid-western Colorado, 6 miles in length, and the third at Cumbers Pass, southwestern Colorado, 1¼ miles in length. The estimating cost of construction is $1,000,000 per mile.

Delaware

Bids will be received until May 12, by State Highway Dept., Dover, for building following roads in New Castle and Sussex Counties: 5.57 mi. road from Armstrong's Corner to Pine Tree, Contr. 27; 4.14 mi. road from Townsend to Pine Tree thence to Odessa, Contrs. 28 and CN3; 3.82 mi. road from Felton to Woodside, Contr. 29; 3.4 mi. road from Coverdale Cross Rds. to Jacob's School; 1.09 mi. road in town of Selbyville and 1.04 mi. Christiana Ave., Wilmington, C. M. Upham, chief engineer.

Georgia

Wayne County Commrs., Ira M. Raybon, Clerk, Jesup, will call for bids to construct roads; $200,000 bonds have been voted.

Indiana

County Commissioners, La Grange, have approved plans and estimates of County Engineer Spears for the Kime Road from Topeka north to Emmatown, a distance of 8 miles, and the Bontrager road west from Emmatown 6 miles to the Elkhart County line.

Commissioners of Noble County have decided upon the construction of more than 70 miles of hard surfaced roads.

The Cass County Commissioners have ordered a petition for the paving of the Michigan road a distance of approximately 15 miles. Estimated cost, approximately, $45,000 a mile, or $657,000.

Iowa

W. E. Egan, auditor of Palo Alto Co., soon lets contract for building Drainage District No. 114, involving 456,666 cu. yd of excavation.

Polk Co. soon lets contract paving 4½ mi. highway, involving 6,641 cu. yd. exca. and 48,695 sq. yd. paving. F. O. Laing, Des Moines, engr.

Polk Co. soon lets contract paving and grading 4.45 mi. White Pole Rd. from west city limits to county line. 20 ft. wide, involving 52,242 sq. yd. vitr. brick or concrete and 7,140 cu. yd. dry earth excav. About $200,000. F. O. Laing, co. engr.

Kentucky

Commissioners of Breathitt Co. plan to grade and drain 6,535 mi. Jackson-Wolf Co. Rd., 20 ft. wide, involving 28 acres clearing and grubbing, 23,065 cu. yd. earth and 75,139 cu. yd. rock excav., 97.58 cu. yd. Class A, 225.55 cu. yd. Class B and 4.89 cu. yd. Class D concrete. W. N. Bosler, Frankfort, road engr.

State Dept. Pub. Rds., Frankfort, plans to grade and drain 15.051 mi. road from Grayson to Olive Hill, 20 ft. wide. Carter Co., involving 107,398 cu. yd. earth and 14.589 cu. yd. rock excav.; drain and surfcae 9 mi. Springfield-Harrodsburg Rd., 16 ft. wide, Washington Co., involving 41,337 cu. yd. earth excav., 21,619 tons crushed stone waterbound macadam. 3.73 acres clearing and grubbing, etc. W. N. Bosler, road engr.

Commissioners of Bourbon Co. plan to re-surface 9 mi. Paris-Owingsville Rd., 20 ft. wide, involving 14,771 cu. yd. earth and 516 cu. yd. rock excav. and 78,603 sq. yd. Kentucky rock asphalt or Topeka paving. W. N. Bosler, Frankfort, state highway engr.

The Red Oak Lumber Co. of Winchester, Ky., will build a narrow-gage railroad to develop timber lands on Carr's Fork of the Kentucky river. Wm. J. McLemore is president, R. L. McLemore vice-president and general manager; R. D. Baker, secretary and treasurer.

Louisiana

Plans for the complete new building of the roadbed of the Missouri, Kansas & Texas R. R., between Shreveport and Hughes Springs, Tex., a distance of 75 miles, were announced by George T. Atkins, Jr.

Michigan

The Michigan Northern Railroad proposes the construction of a line to connect the towns of Ithaca. Alma, St. Louis, Mt. Pleasant, and Midland with Lansing.

Minnesota

Swift County plans to build Judicial Ditch 8, 32 mi. long, involving 1,700,000 cu. yd. excav. and 141 mi. 5-30 in. tile drain. About $541,000. S. B. Gardner, Benson, engr.

A. V. Randall, auditor of Big Stone County, soon lets contract for building 6.14 mi. State Aid Job 2002, 24 ft. wide, cost $45,000; grading 14.9 mi. State Job 2002, 24 ft. wide, $47,000 5 mi. State Job 2004, 24 ft. wide, $25,-000. L. P. Zimmerman, Ortonville, engr.

Missouri

Comrs. of Audrain Co. soon let contract building 6.2 mi. Mexico-Fulton Rd., 24 ft. wide, involving 38,038 lin. ft. grading, 12,690 sq. yd. reconstructed base coarse gravel, 37,900 sq. yd. 2 coarse gravel, 12,690 sq. yd. gravel surface course. About $,55.604.

Board of Aldermen, St. Louis, passed an ordinance providing for the widening of Olive st. at an estimated cost of $2,000,000.

Park Board, Kansas City, has approved plans for the construction of the North Terrace Park Rroadway.

State Highway Dept., Jefferson City, Ralls Co., plans to build 7 mi. London Perry Rd., 24 ft. wide, involving 9,696 cu. yd. earth excav. and 36,960 sq. yd. gravel surfacing. Cost about $27,720.

Comrs. of Buchanan Co. will soon let contract for building 11.2 mi. Jefferson Highway, 30 ft. wide, involving 45,242 cu. yd. earth excav., 53 cu. yd. Class "B" and 74 cu. yd. Class "C" concrete, 2,800 lb. reinforcing, 254 lin. ft. 18-36 in. rein.-con. pipe culverts, (1) 113,363 sq. yd. combination cement concrete header and base course, 100,799 sq. yd. bituminous surface course specifiacation B, (2) 113,363 sq. yd. 1 course concrete pavement. Cost (1) $487,318 and $466,473 respectively.

The Frisco Railroad plans to spend within the next few months more than $1,000,000 in improving its lines within a radius of 200 miles of St. Louis. This work is to begin with the double tracking of the system between Pacific and Eureka, Mo., a distance of sven miles, costing $435,000, and also between Lebanon and Sleeper, Mo., nearly eight miles, costing $225,000. It is expected the work will begin within 30 days. The laying of a double track over this portion of the lines is only preliminary to similar work to be done later on other parts of the system, but it is unlikely that any great amount of this will be done this year. The improvements contemplated for this summer, however, are expected to greatly expedite traffic to and from St. Louis over the Frisco lines.

New Jersey

Plans have been prepared by County Engineer Harry F. Harris Trenton for a five-year program for the building of 25 miles of permanent road was approved by the Board of Freeholders. Estimated cost of Improvements, $1,500,000.

Mercer County will issue $1,500,000 bonds to cover cost of building 25 miles permanent roads, cement, concrete or vitr. brick, to include all heavy truck lines in the county. Above program to cover period of 5 years, 1-5 of work to be completed each year. H. F. Harris is county engineer.

New Mexico

Almost $9,000,000 wil be spent by the State of New Mexico in co-operation with the Federal government in the construction of 49 highways before the end of 1922, a review of the roadbuilding situation prepared by the State Highway Department recently, shows.

The first, an one of the most important of these, the road from the city of Santa Fe to Pankey's Gate, a distance of 9.32 miles, has just recently been completed.

New York

Syracuse will soon begin work on the paving program for 1920. Work includes 61 pavements at an approximate cost of $1,000,000.

Onondaga County will spend $250,000 for the improvement of roads.

North Carolina

Alamance County contemplates the construction of a system of good roads to involve a total expenditure of $1,000,000.

Divisional Office of the State Highway Comm., Greensboro, received no bids March 29, hard surfacing 6.7 mi. road, 16 ft. wide, Federal Aid Project 71, Durham Co. About $190,000. Work will be re-advertised. W. S. Fallis, Raleigh, engr.

Survey is in progress for the proposed extension of the East Carolina Ry. to Snow Hill, N. C., for which $100,000 of bonds were voted by Snow Hill township, Greene county. D. S. Hicks is engineer.

A committee has been appointed to promote plans for a railroad from Raleigh via Dunn and Clinton to Wilmington, N. C., 115 miles, with Major George Butler, Clinton, N. C., as secretary. Proposed capitalization of the company, $600,000.

Ohio capitalists, who plan to drain Lake Mattamuskeet, are also reported planning to build a railroad to connect Swan Quarter and other points in Hyde County with the Norfolk Southern Railroad. The Mayor may be able to give information.

Oklahoma

Logan Co. plans an election soon to vote on $500,000 bonds to built 32 mi. hard surfaced highway. The Federal Government will appropriate a like amount

Approximately 12 blocks in the business district or Lindsay will be paved at an approximate cost of $115,-000. Johnson & Benham, Consulting Engineers, Firestone Building, Kansas City, Mo.

125 blocks in the business and residence districts will be paved in Ada at a cost of approximately $750,000. Johnson & Benham, Consulting Engineers, 8th Floor Firestone Bldg., Kansas City, Mo.

McMCurtain Co. voted $350,000 bonds to complete the Bankhead Highway.

Tulsa County Commrs. invite bids to grade and drain 10½ mi. State Highway between Owasso and Washington County line.

24691

Numerous railway projects started prior to the war are being revived in Oklahoma, and in some instances actual construction is in progress. The Oklahoma Southwestern is being built from Bristow, a point in the south Cushing oil field, to Okmulgee, one of the principal oil cities, approximately 45 miles. Work is under way southeast from Bristow. The builders of the Oklahoma Southwestern are J. A. Frates, formerly general superintendent of the Frisco, and Tom Slick, an oil operator, who have already built three other roads in Oklahoma during the past five years.

Since construction started on the Oklahoma Southwestern its State charter has been amended to permit an extension from Okmulgee southwest to the Red River, in Jefferson county, 250 miles, practically all the way through oil territory. The principal cities on the extension would be Okmulgee, Okemah, Shawnee, Tecumseh, Pauls Valley, Duncan, Waurika, Ryan and Terrall, the latter where the Rock Island railroad crosses the Red River into Texas.

Another extension of the Slick-Frates road discussed, but not as yet provided in a charter, is northwest from Bristow via Oilton to Ponsa City, all the way through oil territory. The people of Ponca City are also asking the extension of a Rock Island line, which now runs from Enid east to Billings, to Ponca City, 30 miles.

Another prior-to-the-war project which will now be completed is the Santa Fe extension southwest from Caney, Kans., to Pawhuska, Okla., approximately 40 miles, also through oil territory. Practically all this distance was graded, but no steel was laid. The charter calls for the extension of this line on west from Pawhuska to Fairfax, crossing practically all of Osage county east and west. It is claimed the line will shorten the distance between Kansas City and Gulf points considerably.

The Santa Fe is also undertaking the relaying of the entire track between Wichita and Kingman, Kans., at an expenditure of $500,000. The new rails will be of the 85-pound-to-the-yard type.

The Chambers of Commerce of Oklahoma City, Waynoka and other towns along the proposed route have endorsed the proposition of a railroad northwest from Oklahoma City via Kingfisher Fairview, Waynoka, Beaver, Guymon and Boise, all in Oklahoma, to the coal fields at Des Moines, N. M., a distance of 370 miles. This is another before-the-war project recently revived. It would open an entirely new agricultural region for practically the entire distance.

Another Northwestern Oklahoma line, now being considered, is one that will connect Buffalo, the county-seat of Harper county, and now without railroad facilities, with either the Missouri Pacific at Hartner, Kansas, or the Santa Fe at Liberal, Kans.

Oregon

Medford Irrigation Dist. plans to develop Fish Lake Project to irrigate 10,000 acres in center of Rogue River Valley fruit and alfalfa district. To obtain storage to supplement the flow of Little Butte and Bear Creeks, rock fill type dams, faced with rein.-concrete will be constructed at outlets of Fish and Fourmile Lakes. Other features of the above project are the enlarging of 20 mi. of existing main canal, constructing 45 mi. new main and feeder canals and about 75 mi. near laterals. District will ask for state certification of $1,250,000 worth of 6 per cent bonds, which have already been voted. D. C. Henry, Spalding Bldg., Portland, consult. dist. engr. J. P. Platt, Medford, dist. engr.

Portland plans harbor improvements at an expenditure of $3,000,000.

Pennsylvania

Road Improvements in Allegheny County, Pennsylvania, involving an expenditure of $1,000,000 will be made during the coming season, according to an announcement made following a conference between the county and state highway officials. It is reported that the state has agreed to improve about 80 mi. of the Lincoln, William Penn and Perry Highways and the Freeport and Elkhorn Roads in the county. The state will also do all the work on the Carnot Road leading into Beaver County from Stoops Ferry; will take over the state road from Carrick through Castle Shannon to Library and complete a portion of the Butler Plank Road. Improvement of the Frankstown Avenue extension along the Verona car line was also taken under consideration.

South Carolina

The issue of nearly $6,000,000 of bonds has recently been authorized in this state for the building, paving and improving of roads. This is reported to be divided among the counties as follows:

Abbeville County	$450,000
Barnwell County	250,000
Beaufort County	300,000
Marlboro County	150,000
Lee County	100,000
Kershaw County	400,000
Charleston County	400,000
Darlington County	800,000
Florence County	800,000
Cherokee County	100,000
Williamsburg County	80,000
Lawrens County	100,00
Lexington County	100,000
McCormick County	60,000
Clarendon County	400,000
Berkeley County	100,000
Newberry County	400,000
Orangeburg County	300,000
Jasper County	200,000
Dorchester County	320,000
Saluda County	40,000
Oconee County	400,000
Colleton County	83,500

State Highway Comn., Columbia, plans to sand clay or top soil road from Pickens to North Carolina line. About $140,000. W. S. Fallis, Raleigh, state highway engineer.

Sanitary & Drainage Comn. Charleston Co. will soon let contract for building 7.384 mi. Charleston-Savannah Highway, Federal Aid Project 81, involving 10.25 acres clearing and grubbing, 46,733 cu. yd. earth excav., 77,880 sq. yd. asphaltic concrete paving, 126.6 cu. yd. Class "A" 97.6 cu. yd. Class "B" and 76.6 cu. yd. Class "C" concrete in bridges and culverts, also 45.8 cu. yd. Class "B" concrete for headwalls, etc.

Abbeville County Commrs. will construct 150 mi. of topsoil roads; $450,000 bonds available.

South Dakota

State Highway Comn., Pierre, will soon receive bids for grading and building drainage structures on 7.58 mi. White River-Murdo Rd., 24-36 ft wide, Federal Aid Project 58, Jones Co., involving 48,500 cu. yd. earth excav., 2,967 cu. yd. gravel surfacing, 900 lin. ft. concrete or corrugated pipe, 200 cu. yd. concrete for culverts, 11,000 lb. reinforced steel, one 45 ft. span steel truss, cost $48,000; grading, graveling and draining 18.2 mi. Watertown-Clark Rd., 24 ft. wide, Federal Aid Project 57, Codington Co. 72,800 cu. yd. earth excav., 27,300 cu. yd. gravel surfacing, 1,400 lin. ft. concrete or corrugated culverts, 760 cu. yd. concrete for culverts, 42,000 lb. reinforcing steel, $122,000. F. S. Peck is state highway engineer.

State Highway Comn., Pierre, will soon let contract for gravel surfacing 9.05 mi. Mobridge McIntosh Highway, 20 ft. wide, Federal Aid Project 29, Corson Co., involving 2,000 cu. yd. excav., 6,110 cu. yd. gravel; grading and

building drainage structures on same 36 ft. wide, involving 57,245 cu. yd. excav., 20,247 yd. overhauling, 237 cu. yd. Class "A" and 25 cu. yd. Class "B" concrete, 17,000 lb. reinforcing steel, 426 lin. ft. concrete or corrugated iron pipe culverts. F. S. Peck is state highway engineer.

Texas

At least forty-seven miles of highway construction is to be started in Wichita County shortly, involving an expenditure of about $2,000,000. J. W. Isbell, county road superintendent, will supply information relative to the scope of work contemplated.

At a recent meeting of the directors of the Kansas City, Mexico & Orient, held at San Angelo, the matter of resuming the construction at an early date of the long proposed branch line that is to run from that city to Del Rio, a distance of 170 miles, was informally discussed. It is planned to carry this project to fulfillment as soon as the necessary financial arrangements for doing so can be made. Part of the grade for this branch was constructed a few years ago. With its completion and the construction of an international railroad bridge across the Rio Grande river, connecting Del Rio with Las Vacas, Mexico, a new international gateway will have been established. The National Railways of Mexico have had a branch line under construction for some time. This line is to run from Allende, on its Eagle Pass Toreon division, to Las Vacas, about 75 miles, passing through a region that is under irrigation and in a high state of cultivation.

The State Highway Department has designated the road from San Angelo to Eden, Concho County, as a branch of State Highway No. 9, and part of Puget Sound to Gulf Highway, and appropriated 100,000 in federal aid for construction work. Bids for contract will be asked for road work on which probably $450,000 will be spent. The county has $350,000 available. The road will be paved north and south of San Angelo for a considerable distance, it is said.

The survey of Levee Improvement District No. 3, on Cuthand, has been completed, and P. Y. Creager of Clarksville announced the beginning shortly of levee construction. Russell Johnson will have charge of the work. Approximately 1,290 acres of land will be reclaimed.

Guadalupe County plans to grade, gravel surface and drain 18.5 miles of Highway 3 from here to Bexar County, 16 ft. wide, involving 10 acres clearing and grubbing, 85,000 cu. yd. earth excav., 163,000 lb. reinforcing steel, 2,019 sq. yd. concrete dips, 1,582 cu. yd. Class "A" and 69 cu. yd. Class "B" concrete. About $149,814. Hess & Skinner, Southwestern Life Bldg., Austin, engrs.

Comrs. of Grayson County will soon let contract for building 9 miles of gravel road in Rd. Dist. 7, extending north and south of Tom Bean. J. C. Field, county engineer.

J. E. Bradley, judge, Limestone County, will soon let contract for grading and draining 45.6 mi. roads, involving 13 acres clearing and grubbing, 222,000 cu. yd. earth and 560 cu. yd. solid rock excav., 1,200 cu. yd. Class "A" and 1,300 cu. yd. Class "B" concrete, 216,000 lb. reinforcing and 375,000 lb. structural steel, etc.

Capt. W. E. Tyrell of Beaumont, Tex., and H. W. Dew of Dew Bros. Rice Co., Houston, Tex., are reported working on a plan to build a railroad from Nome to Anahuac, about 25 miles.

The St. Louis Southwestern Ry. contemplates considerable construction of industrial tracks at Fort Worth. A. A. Matthews is chief engineer, at Tyler, Tex.

James F. Halpin and C. Endsley, Uvalde, Tex., representing an eastern syndicate, have taken preliminary steps for the construction of a railroad from Uvalde to Camp Wood, about 30 miles, to open up extensive cedar forests and develop Real and Edwards counties. An agreement has been reached with the property-owners along the route, and it is said that considerable material and equipment has already been purchased.

Contracts for more than $1,000,000 of road construction in Collin County will be ready to bid on shortly, according to Burke Crockett, County Engineer. The contract will call for the construction of 31½ miles of road from Marilee to the Dallas County line, traversing the Celina, Prosper, Frisco and Plano district. Bids will also be asked for work in the Valdasta district, six miles; ten miles of roads in the Westminster district; 13 miles of roads in the Weston district. All surveys have been made on State Highway No. 5a, 37.8 miles in length, traversing East Collin, Blue Ridge, Farmersville, Copeville and Wylie districts, and will be built at a cost of $600,000.

Utah

A road program has been adopted for Millard County, which will mean an expenditure of more than $400,000 in this county for state highway improvement this year. Bonds to cover this have already been voted and the county is read to market them.

State Highway Commission, Salt Lake City, plans to build a portion of Federal Aid Project 9, 5.14 mi. Sec. "G" from Holden toward Kanosh and 4.98 mi. Sect. "K" toward Holden, hard surface pavement. B. J. Finch is dist. engr.

Washington

According to James Allen, State Board Commissioner of Washington, the tentative program for 1920 aggregates $3,475,000, including Federal Aid on post roads. This calls for 48 miles of concrete paving and 107 miles of grading, grubbing and surfacing, in which the Pacific Highway will receive the greater part of the paving all of which is specified as concrete. In most instances, the work now projected will line up gaps, while in others it will mark the beginning of new work to be extended as rapidly as possible.

According to county commisioners, Lundstrom County, a local improvement district in this county, will be established, involving 25 miles of work at a cost of $250,000.

Tentative plans for 1920 road construction work under the $3,250,000 good roads bond issue, are being arranged in the office of H. J. Doolittle, Construction Engineer.

Chief Engineer, E. M. Chandler, submitted survey of the Kittitas irrigation project, involving the reclamation of 68,000 acres of land, at a total cost of $10,296,020.

Four Olympic Highway improvements covering a total of about eight miles will be undertaken in Grays Harbor County this spring.

Comrs. of King County rejected only bid received April 6, grading 6 mi. Renton-Maple Valley Rd., 20 ft. wide. About $73,700. Work will be re-advertised. S. J. Humes is County Engineer.

West Virginia

Directors of the Greenbrier & Eastern R. R. plan the construction of a standard gage railroad from a point near Rainelle to the coal fields of the Gauley Coal Land Co., a distance of 8½ miles. R. M. Bell, Charleston, W. Va., is interested in the project.

The Rogerts Engineering Co. of Charleston, W. Va., will make a survey for a 30-mile standard road extension for the Morgantown and Wheeling R. R. Co., with headquarters at Mannington, W. Va.

Wisconsin

The Eastern Wisconsin Railway & Light Company is to build a mammoth power plant soon at Fond du Lac. A bond issue of $1,200,000 is to finance the plant, and other improvements at Sheboygan and Oshkosh.

State Highway Dept., Court House, Rhinelander, rejected bids received March 25, grading and paving Woodruff-Fifield Rd., Federal Aid Project 165, Vilas Co., involving 53,722 cu. yd. excav., 204.5 cu. yd. concrete in culverts, 57.65 acres clearing and grubbing, etc. Work will be re-advertised.

Foreign

In Portuguese East Africa an important program of railway construction is contemplated, estimating to cost £3,000,000 (normally $14,500,000). Survey parties have been formed, with many engineers from the Union of South Africa. One line is from Lourenco Marques through Gaza to Inhambane, a distance of 250 miles, in order that the rich coastal belt may be opened up. A large graving dock will be constructed at Lourenco Marques and the harbor will be improved. The other two lines to be started at once are from Quelimane and Lumbo, the port opposite to the island of Mozahbique. Harbor works at Lumbo will be commenced.

The long projected railway from Beira to the Zambesi river in East Africa is about to be realized. The new road will connect with the British Central Railway system at Chindio, and will thus provide through rail communication from Beira to Nyasaland. The Beira-Zambesi line will be about 170 miles long and will take approximately two years to complete. The greater part of the line runs through the Portuguese territory.

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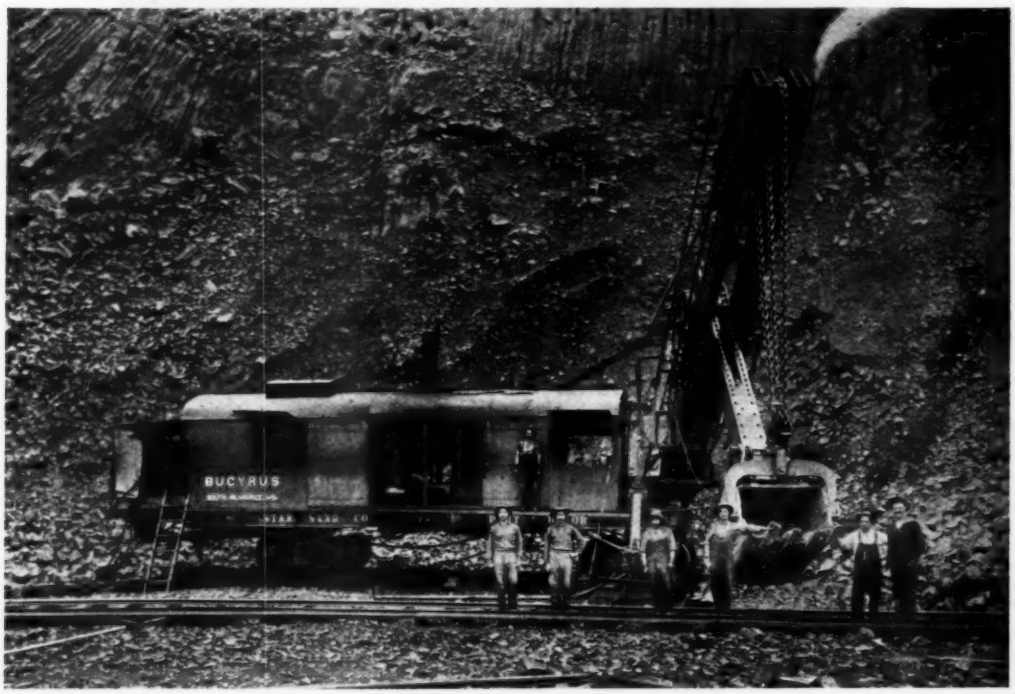

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